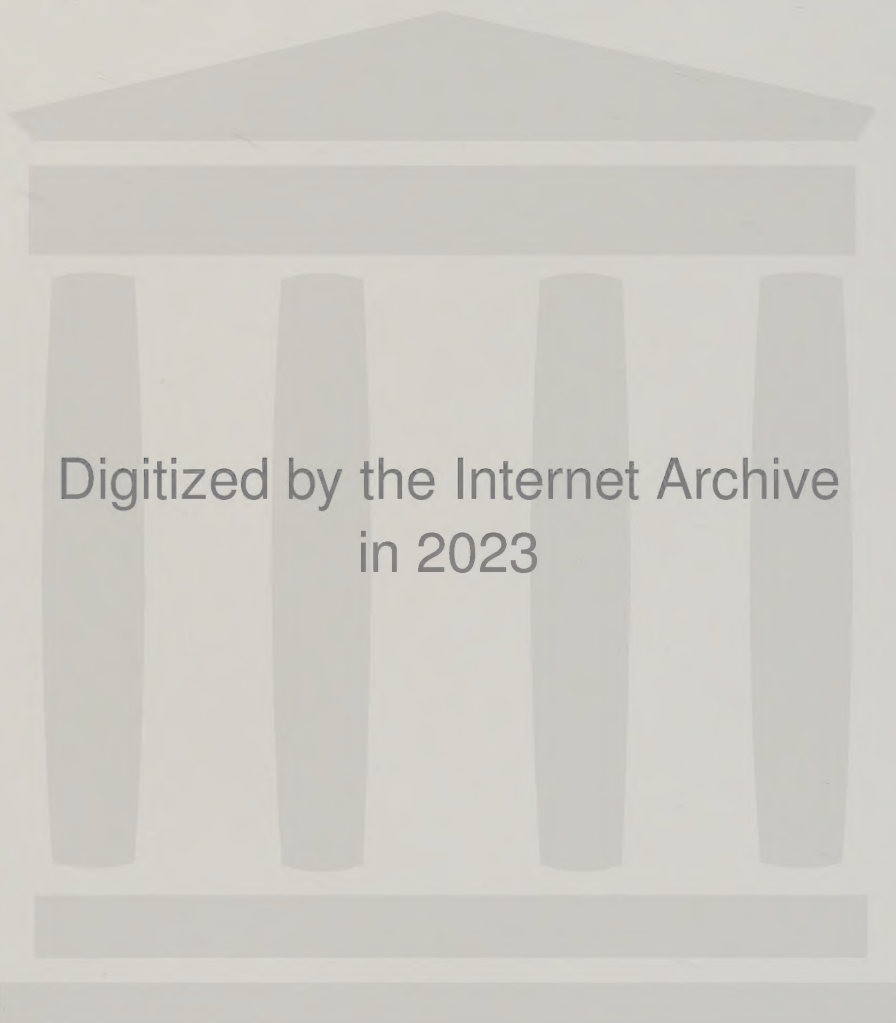


LOGIC

FROM IMAGES TO DIGITS



RANDALL AUXIER



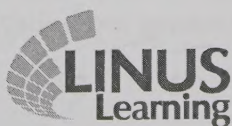
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LOGIC

FROM IMAGES TO DIGITS

RANDALL AUXIER



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PREFACE

Most logic books are not very useful to students. They don't teach them much about how people actually think, and how to make it better. What's the point of learning logic unless it actually helps you think more clearly, more effectively, and in ways that make a difference to your daily life? The regular logic books contain examples that never come up in daily life, expressed in stilted language and full of artificial difficulties. It isn't clear that even a complete mastery of extensional logic (the type that has been dominant for a century) is an aid to human thinking. In short, the regular logic class taken by hundreds of thousands of college and university students in the US and Canada every year is irrelevant to life.

The history of this failure is that there were some important breakthroughs in logical theory in the 20th century, and professors got so excited about it, and about winning the Cold War by means of science, that they ceased paying attention to what real people do on a daily basis. They tried to create generations of scientists who would gain the upper hand on the enemy, whoever that was at the time. In the meantime, bad habits invaded our general education curricula, and then were passed on.



Now no one can remember when logic was about how to think well. If you look at old logic books from the 19th and early 20th century, you'll find something surprising. The logic they contain is actually useful. There have been a number of "movements" to improve logic, the most important being the critical thinking movement, beginning in the 1980s. But most of these books are just extensional logic lite, with cream. I think it was better than wasting students' time with extensional symbolic logic, but ultimately not a success.

Before extensional logic, which might also be called "the logic of reference" eclipsed all other kinds of logic, serious study was given to both reference and meaning. The study of meaning was dropped by formal logicians mainly during the later 19th century. That was a mistake. It is much more difficult to formalize meaning relations than reference relations, and since we made great progress formalizing reference, we began to pretend that this was the real business of logic. It wasn't a good idea then and it isn't now.

The book you have in your hands takes you on a journey that formalizes and conserves meaning. The study of meaning did not cease in the 20th century, but much of it moved into specialized areas of philosophy (ordinary language philosophy, semiotics), and was taken over in part by other disciplines, especially linguistics, but also literary criticism played a crucial role in the continuing development of theories of meaning. You will find all of these disciplines synthesized in this book, into a system of formal expression that actually addresses the way you think and the way you interpret the world.

This book also captures and utilizes the advances in extensional logic in the 20th century, so far as they are useful. Their main use has been to program computers. This book will teach you the basics of the logical side of computer programming, and by the end, you will understand how human language can become 1's and 0's—the digitization of the world. As far as I know, there is no other book that does this. Creating the system that is here presented to students required thousands of decisions about what to leave in and what to leave out, how to make a regular vocabulary for expressing the levels of the system, and what order to present the material for best comprehension. This book was 35 years in development and has been tested numerous times in the classroom as it was gradually written. That process of testing and writing took ten years. The results are far from perfect, but they can be improved from here.

When the publishers contacted me with the idea of a new logic book from my philosophical perspective, I had already been working on it actively for some years. Since they contacted me, I took the moment to insist that the book must be affordable for students. I asked that the publisher ask only \$20 (of course bookstores mark it up, but they shouldn't be marking it up more than about \$5), and these wonderful publishers agreed. They have incorporated the most up-to-



date publishing techniques, including the QR codes for hyperlinks, and availability of a digital upload, and the print-on-demand format. The book will be supported by on-line teaching aids and various materials for teachers. Because of the current technology, it is possible to make improvements and corrections as time goes on. These new developments make it possible to give students and teachers a format that is much more flexible and interesting than the usual college textbook.

One further note. I have not maintained the usual decorum of vocabulary and expression. I have never seen the point in pretending to be a neutral or objective arbiter of knowledge. Genuine knowledge is always dependent on interpretation, and this book will make you better at making judgments and interpretations, and at being aware and in control of your thinking processes. But the perspective on how to achieve this is mine, as a teacher and as a philosopher. The book sums up and simplifies what I have learned in over thirty years of teaching philosophy, and studying it and writing about it. I take responsibility for the synthesis of perspectives presented in this book and I know from experience that students benefit from learning this system. But it is not the standard system. I think it is better. Many will disagree. I don't actually care. Some will agree. That's good enough for me. If you want to see more detailed and sophisticated explanations and defenses of what I'm doing in this book, my professional writings are easy to find.

I have to acknowledge the help of a fairly large group of people over the years, but I cannot list them all. First and foremost, however, is the Logic Research Group that I formed with Gary Herstein in 2011. That group still meets. Its goal, which finds partial fruition in this book, was to study the history of logic and find a solution for the unsatisfactory condition of logic in the 21st century. We began by doing a slow read of C.I. Lewis's *A Survey of Symbolic Logic* (1917), which led us rather quickly to the problem of meaning conservation through logical transformations. From there we went back to 17th century sources and traced the course of intensive logics of meaning up through the 19th century. This process took some years and included some interesting discoveries, including many months devoted to studying the forgotten German logician Louis Castillon, whose writings we translated from French (I expect these will be published eventually), and whose system we attempted to reconstruct. We were unable to do that because he just didn't leave behind enough information to enable us to do it, but he claimed to have invented a system of intensive logic that preserved and generalized all of the valid syllogisms of the Aristotelian system.

But, almost by accident, just as we were realizing we could not recover Castillon's system, we discovered a forgotten book by Delton Thomas Howard, psychology professor from Northwestern University and a student of John Dewey, that actually did accomplish what Castillon had claimed to do. It was a synthesis of Dewey's logic and Aristotle's. We spent a year and a half discussing and working



through it. That is a very impressive book. Howard taught it to his own students for many years. We also made liberal use of some of Susanne Langer's adaptations of Whitehead/Russell to an ordinary language context (Wittgenstein especially). Finally, it was time to write something, and that is this book, which is only the beginning of the output I expect from this group.

The people who did this work have changed over the years. I believe that Marc Anderson, of the University of Nancy in France, is the only person apart from myself who was there at every step, and my gratitude to him is boundless. Others who were there for long periods include the co-founder of the group Gary Herstein, with whom I co-wrote *The Quantum of Explanation* (Routledge 2017). Many of the ideas we hammered out over the 20-ish years during which we worked on that book find use and new expression in this book, especially the theory of extensive connection with which this book culminates. It is certain that I never would have understood Whitehead as well as I do without Gary's help.

There have been three members of this group who co-taught this material with me and helped me correct it through trial use. Matthew A. Ryg, now of the Minnesota Education Association, assisted me on the first run and kept it from being a disaster. Eli Kramer, now of the University of Wroclaw in Poland, co-taught the second run, and has hung with the group to the present. He has been my constant interlocutor through this long process, since, I believe, 2014. Leslie M. Murray solo taught the beta-version of this book and remains a part of the research group. His experiences led to the final revisions, as the whole group worked through the full book, word by word. The other contributors to the final process included John W. August III, and Matthew Z. Donnelly, currently of John A. Logan College (who is taking this book public this semester and has been teaching the ideas from the logic group to his own classes for some years now, at several colleges). In the past year we were joined by Roger Hunt of Ideatrek, whose dynamic presence has given the group a huge boost. A dozen other people have moved through this group through the years, contributing to the work. I am proud to call all of them friends and I believe this book meets with their approval, even if many disagreements remain.

I would like to be able to thank some past teachers, but I didn't have any who helped with this. Nevertheless, I had some good teachers and I appreciate them. I had two mentors, never formally my teachers who really did help. First was Jaakko Hintikka (rest his decent and kind soul) whom I could ask questions and who seemed to understand and appreciate what I was trying to do. He mostly agreed with the project, and his ideas are sprinkled throughout the system. The second was Umberto Eco (his playful and mischievous soul will never rest), who listened and tested me, and then did it again and again with a hundred trick questions, seeing whether I could wiggle my way out of whatever trap he set for me. He was merciful toward those who could not break free of his snares, in my experience. His ideas pervade this book.

I also must acknowledge that my discussions with David Beisecker of the University of Nevada Las Vegas have been numerous and helpful, and he emboldened me to drop the idea that “truth” needs to do any heavy lifting in my system. I doubt seriously he has much agreement with what I have done, but he contributed to it anyway. Apart from that, there were a few key pragmatists who helped out with discussions: Scott Pratt, Paul Cherlin, Lucio Privitello, Larry Hickman, Ken Stickers, and John Shook; and some process philosophers such as Bob Neville, Doug Anderson, and Myron Jackson; and some phenomenologists including Jim McLachlan, Przemek Burztyka and Marcin Rychter. All of these folks have listened to the ideas about possibility and form that are included in this system and have asked me questions that required me to change my thinking.

This book really does seek to overcome the divides among schools of philosophical method, being a blend of analytic, phenomenological, pragmatist, semiotic, personalist, and process thought. I have not avoided metaphysics, naturalism, psychology, social theory, even political theory, as other logics have tried, variously, to do. I most of all have not avoided rhetoric. My teacher and mentor Donald Phillip Verene, who does not hold out much hope for formal logic, convinced me long ago that philosophy divorced from rhetoric was always bad philosophy. That is not a popular view, but I believe it to be correct and I will not change my mind about this. As a result, almost as much attention has been given in this book to persuasion as to formalization of thinking. That is part of what makes the book and the system relevant to daily life. There is a companion volume on persuasion which has a number of identical chapters to this book. Feel free to see how these ideas issue into a system of persuasion as well.

Finally, I must thank the publishers, especially Jay Herath, at Linus and Rylan for their amazing patience with my process of bringing this book into usable form. I have worked with many publishers. They have been the best I have ever worked with. I thank them for their excellent work.

This book is dedicated to the memory of Jaakko Hintikka and Umberto Eco. In my next incarnation, I want to come back as a cat owned by at least one of them (in their next life). The existential import of this proposition creates a problem that is resolved in this book due to their playful assistance.





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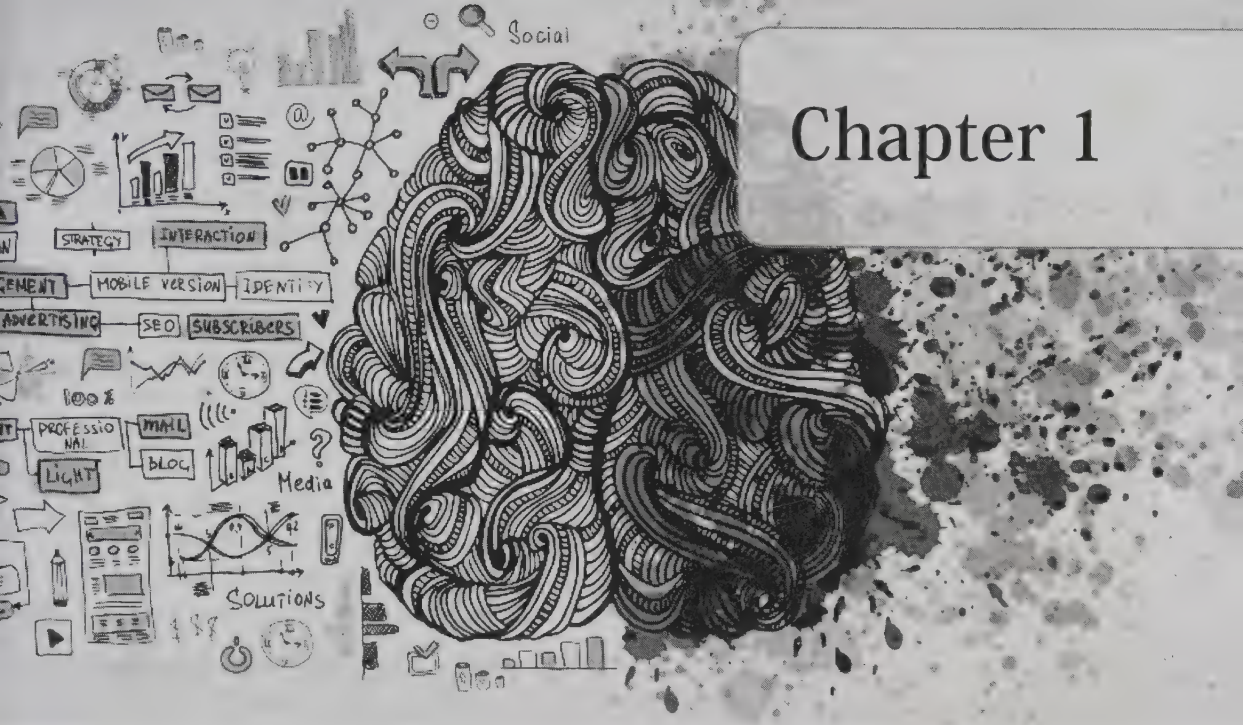
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Chapter 1

THE REAL PROCESS OF THINKING

Your Present Situation

Most of you haven't been exposed to logic prior to now, and although you have seen persuasion at work, you probably haven't studied it systematically before. Welcome to a new world. Before I can take you into that world, however, I have to do a few things to your mind—or to your *mind*ing process. It isn't about your psychology and I am not a shrink. It's about how you think. You are probably very good at thinking already, and you may be good at persuading your friends to go where you prefer.

But the trouble is that you have learned it by trial and error, then by habit, and you may not grasp *why* you are able to do what you already do. That means you are at the mercy of your own (fairly successful) habits. Still, when these habits *don't* succeed, you will not be able to adjust as quickly as people who *do* fully understand



how their own thinking works, and where it is vulnerable to error and failure. And people who are naturally good at persuading others often depend too much on charisma and pressure. So, I have to do two things with you and for you.

First, I have to help you slow down your thinking and reflecting processes so that you can catch sight of what you are *already* doing. It isn't easy. I wish we could have a conversation. I could show you more easily than I can tell you in writing how to catch yourself thinking and how to tell active thinking from reflective thinking. You switch between these at lightning speed, but they are different kinds of thinking, with different rules. Yes, I'd like to just show you, but you're there and I'm here, so I will have to do my best with writing it down, and show you with examples and such, to get you to perceive the differences, and to catch each kind of thinking in its process of happening.

Second, I have to get you to become conscious and systematic about how you approach arguments. I do not mean disputes that carry your emotional needs to the surface in shouting and pleading, although that is the most important kind of argument. I want to include that kind of argument, but what I mainly mean is the process of *giving reasons* for why you (or someone else) should do what you do or believe what you believe. In logic the aim is always to reduce ambiguity and vagueness of those reasons and conclusions to a minimum.

Yet, almost no one is ever convinced by logic alone, and persuasion sometimes depends on being tactically or strategically vague. Vagueness is not always our enemy. It depends on our purposes. But here is the thing: the ability to be vague in the right way at the right time also depends upon *knowing* what *all* the pieces of the argument really are. You can't be in control of your own vagueness unless you know what you are leaving out or leaving unclear. That means that you must know the full and explicit structure of your argument, even if you don't present it that way. And when you can do that, you can not only command the reasons, but also the practical *use* of those reasons in persuading others.

That means that logic students must learn some things about persuasion and persuasion students must learn some things about logic. There are companion volumes available, then, depending on which class you are taking. The one in your hands is the logic book. It will include a significant amount of information about persuasion and how to use logic, but the purpose of this book is actually to begin with your imagination, the images in your mind, and to trace their form and structure into language, and to bring that language down to its operations in 1's and 0's that are used to communicate with computers, and through computers, to the physical world of electromagnetic patterns and possibilities. The physical world you live in *can* be persuaded, but not much of it can be persuaded in English. You need a simpler language, and I will teach it to you.

What logic and persuasion students have in common, then, is that both have to be able to make everything they think explicit, to commit it to paper (or to screen—but paper is better) in a form that puts them in control of everything that might



be relevant to their aims. For several classes, both sorts of students, logic and persuasion, will be learning exactly the same skills. Even as the aim of persuasion arcs in one direction and the goals of logic diverge in another, the golden strand that connects them is never really broken.

People who study logic still worry about what arguments *ought* to persuade them. I mean, nobody wants to be deceived or fooled by errors and tricks. Meanwhile students of persuasion always need better and better formal analysis, so as to bring their persuasive efforts toward reasonableness, accuracy, and the courage to speak truth to power. That is what it takes to persuade others, assuming you want to be honest and morally decent. So logic is good at helping us learn what *should* persuade us, while persuasion (and the whole study of rhetoric) teaches us how to persuade others, independent of whether we are ourselves wholly persuaded.

In your future life, you will probably be called upon to persuade others of things you are not persuaded about yourself. It is difficult, for example, to sell a product you wouldn't buy, yourself. But it can be done, as you know. Your ability to speak about something reasonably, accurately, truthfully depends on your logical powers. Your ability to make that speech persuasive depends on your rhetorical powers. You cannot succeed without both. So, you must learn logic to learn persuasion, and you must learn persuasion to make use of your logic, in your future life.

Your Thinking

The problem with human thinking is that it happens so fast that humans don't notice themselves doing it. The problem with persuasion is that it happens deep down in our emotional lives and is difficult to bring fully to the surface. So, when we think it is hard to describe what we are doing, and when we are persuaded it isn't easy to say why.

The meaning of the word "logic" is vague in our everyday language. It generally means whatever is both unfeeling (Spock-like) and also supposedly indisputable about relations between concepts and events. "It's the logic of the thing," we say, and "you can't argue with logic." The bad news is that even professional logicians disagree about how to define logic. I'll expend lot of effort here to explain *what* logic is. But in the briefest terms, **logic is the study of the structural norms that relate human thinking to the rest of human experience, including action.** Man, I hate having to write like that. It's just the sort of crap I despised reading when I was a student, and here I am foisting it on you. Sorry. Let me try something different.

The problem is with the term "structural norms." I mean, what the heck is that? You probably learned about norms in sociology class, probably. It just means you can do better and worse at anything you're doing, according to the common values



of your group. Maybe you're good at baseball, or dancing, but that person over there is better, and the other person over here isn't as good as you. In order to say "good" we have to have a standard. That's a norm. To say "better" and "worse" we need a scale. We started with you, and now one is better and one is worse, and presto, we have a *structure*. When you conform to a "norm" you commit yourself to doing better in the judgment of others, and probably in your own judgment too. If I am saying that, say major league baseball players are "best," while someone who can't play at all is "worst," then we know how to apply the "norm" to anyone. So, our structure is objective, not just a comparison of people in the room.

Logic is a structure of that kind. You are good at thinking, probably, but relative to the norms of thinking itself, your thinking is likely worse than it should be, rather than better, at *this* point. So you need to learn the structural norms of thinking. At least you'll have an idea about where the problems are and if you *want* to do better, you can manage it. You can lead a student to logic, but you can't make one think.

But it's tricky. The norms for thinking definitely vary from one culture to another. They might even differ according to our differences in physiology (since thinking is *at least* a physiological process, even if it may be more). Some say that thinking may differ in material or structure depending upon such factors as gender or race, or even the geography of our environment.

Perhaps the norms of thinking for mountain people are different from those of river people, for example. Mountain people know all about mountain-things and river people know about river-things. Mountain people have strong legs for walking up and down; river people have long muscles from swimming. If a mountain person sees a steep hill, he will know whether he can climb it, and how. If a river person sees a river, she will know whether she can swim it, and how. And not vice-versa. Maybe they really do think differently from one another.

I doubt that the structural norms are different, at least as it relates to logic and the modern human mind, but I don't rule it out. Our human differences can be crucial to everything we think and do. There may not be any universal norms of thinking, but there are some general norms that seem to be adaptable to our differences. That is what we will pursue here. Even though we find great challenges in communicating across our differences, we can do better at overcoming the problems they pose by honing our active thinking and our processes of reflection.

So, your mind is wandering. **Isn't it?** I caught you. Get a piece of paper and write down in a sentence, whatever you were just thinking.

Now, without re-reading, write down what logic is, in one sentence, on the same piece of paper.

Now, think about the relation between the two sentences. When you do this, you are "reflecting." When you judge the value of doing this, you are applying a norm.

Now, consider this dog:

Olfactory Epithelium

A catacomb at the back of the nasal passage houses sensory receptors.

Humans	Dogs
1 in²	30 in²
surface area	surface area
~6	~250
million	million
receptors	receptors

cross section



Olfactory Bulb

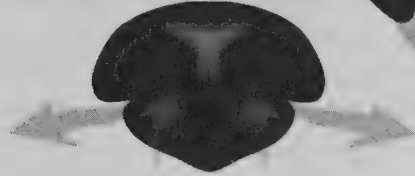
A brain region that processes signals from the olfactory epithelium. Canine olfactory bulbs are **3 times larger** than those of humans, even though their brains are **10 times smaller**.

Vomeronasal Organ

A sensory organ that detects pheromones picked up by a dog's wet nose.

Nostrils

Air is exhaled through the side slits, so it doesn't dilute the scent of incoming air.



Source: <https://www.quora.com/What-are-the-biggest-challenges-to-training-guide-dogs-for-the-visually-impaired>

Can a dog think? I believe the patterns of thinking among non-human animals also exhibit a logic that is, in some cases, more complex and subtle than our common human processes and their structure and norms. The experts say that a dog's nose is about ten-thousand times more sensitive than our most powerful sense (sight). Certainly their noses are almost out of comparing to ours. One square inch of our olfactory epithelium compared to 30 square inches in a dog? About 6 million receptors in us compared to 250 million in them? An olfactory bulb three times as large? And a brain ten times smaller processing all of that olfactory information? Whatever dogs are thinking, it's about the smell.

Now, imagine being able to *see* ten-thousand times better than you do –who knows what you would see? New colors? This would be ultra-ultra HD. I don't think I want to see you that clearly, and I definitely don't want you to see me with such vision. But if we could see that well, we would think differently than we do. A dog's world includes a superpower, but to them it's just a part of dog common sense. I think they don't sit around wondering what it would be like to have one of your super powers (your opposable thumbs, for example). They just take in the smells and combine them with what they see and hear (called "synesthesia") and then they think about where to go, what to do next, when their best friends will come home from work, what will be for supper.



And *your* active thinking is similar, but you work with different sensations, ten-thousand times duller (don't complain; you wouldn't want it any other way). Yes, your dog will recognize you, by your scent, or the sound of your voice, even where you can't recognize your dog on sight (in the dark, for example). Dogs have brains (small though they are) especially suited to active processing of all that olfactory sensation. There is nothing in your experience comparable to that kind of "thinking." The issue of whether we should call this "thinking" is controversial, but I believe it is right to call it "thinking," because we do the analogous thing with our duller senses, and besides, all our understanding of what it's like to be a dog or cat or horse or bat runs on analogies (and we will be learning a good deal about analogies in this book).

Hey, Can You Say It?

Now, if you tried to say out loud what you are actually thinking from moment to moment, it would be a mess. You change your path of thinking every couple of seconds, skipping around over the various objects and goals and plans that are obvious and articulating in your thinking the parts that need a boost, the boost of inner language. Probably your dog moves even faster, in some ways, since a lot of stuff is obvious to dogs that is difficult for us (and vice-versa).

The philosopher Josiah Royce once offered this example of what our active thinking looks like, while a quail hunter is out hunting with his dog:

That is the chirp of a quail. It was in that direction. They must be in there. Not far away. If they fly up from that point, and are shot, I shall not be able to get them. The brush is too thick. No dog could get in there. Yes, my dog could. He will go anywhere. But last month he failed to get through some such thorny underbrush as this. Besides, there are some steep rocks beyond. The quail will fall among them and never be found. I must wait 'til they are out.
(*Primer of Logical Analysis*, p. 16)

As entertaining as this is to consider, our active thinking isn't quite this clean or clear. We don't always think in complete sentences, sometimes not in sentences at all, or even words. Sometimes we think in images. In our real experience, thoughts tumble over one another, interrupt one another, slide off the edges of our train of thinking and suddenly pop up again without warning. Associations fly off into the distance sometimes and never return, while sometimes we lapse into reverie or daydream, only to come back to the present moment disoriented and needing a moment to compose ourselves and rejoin ourselves to the flow of time. It's awfully hard to describe. But we'll get there. Sort of.

We do this even in the midst of goal-directed activity. I must walk from another room to the kitchen to get something from the refrigerator. But it takes fifteen

seconds. I am thinking of something else by then, open the door of the fridge, stare blankly into the cool and must somehow recollect what I wanted. In the course of getting ready in the morning, my thinking is so absorbed in anticipation of the day's activities that I emerge fully dressed, ready to go, and then notice I have forgotten to shave (or something worse). Our animal companions probably forget things even faster, but then remember them with greater surprise sometimes, when memory possesses them. Truth be told, all our science grasps not much about this. Part of the reason is that the passage of time (and our experience of that) is so poorly understood. We need a strategy for pinning down the passage of time and its relation to our thinking.

You and Time

When we read out loud, for instance, or read music from a page, our active thinking is extremely focused and runs a bit ahead of our bodies. Our fingers play or our voices pronounce what we saw and processed a half second before. And when the task requires even greater focus, such as hitting a baseball or catching a football, almost everything goes blank as the full weight of thinking is devoted to coordinating our sensation with our perception and sensorimotor responses. It is quite an experience to have all of these systems converge into a series of coordinated actions, but no sooner do they do we accomplish the action than they diverge again and we can feel ourselves narrating our actions to ourselves, either a bit ahead of acting, or as commentary on what we just did. That inner voice is weird, but it's important. It holds onto what just happened for a moment or tells us what will happen in a moment, and it expands our experience of time, from the immediate present instant into a longer span of a few seconds.

Our active thinking lives in that few seconds, and it feels like it happens all at once. How many times have you read a phone number and had to look away to dial it, or write it down? What do you do? You repeat it to yourself, silently or out loud, so you can hold it long enough to transfer it to an action performed a longer moment later. When we are younger this is easier, and it gets harder as we age. By repeating the number you shut out other thoughts that will intervene if you don't do it. Repeating is a way of disciplining your unruly thinking into conforming to the task you want to perform. That is a kind of norm, imposing an order on your thinking for the sake of goal. There are numerous other ways to develop norms for thinking. Mnemonic devices, memory aids, are another way to "norm" our thinking. I had a phone number that included the digits "1798." I wanted to remember it, so I poked around to find out what happened in the year 1798. Not much as it turned out. But George Washington died the next year, 1799. That was good enough. My number was the year before Washington died. It worked. You've done stuff like that too. You are "norming" your thinking with a mnemonic device.



When we consider our close animal companions—the cats, dogs, birds, and horses with whom we communicate, as if they could interpret human language—there is little doubting that they also think, trying to figure us out as we talk to them. They coordinate their varied sensations with their perceptions and choose their actions. Sometimes the horse will attempt the jump, sometimes it pulls up short. Sometimes the bird will repeat our words back to us, or even ask for a drink of water or a cracker, sometimes it will not. There is no question that these and other animals have sophisticated forms of communication and that the ones we live with find ways to communicate with us as we do with them. Some of them clearly know that our language is an effort to reach them, and the ones best at human communication (dogs are probably the best) can interpret very accurately the intent of our language, and sometimes they do it so well that we must conclude they do “understand” us.

But I very much doubt that these animals experience that little voice that runs ahead of our actions, or that comments on what we just did. Our animal friends are better at being in the present moment than we are (which is perhaps why they often seem to be happier), while the poor humans have their thinking spread out over a distant past that recurs in present thinking for no apparent reason, and we become vexed over the distant future and feel sometimes imprisoned between our births and our deaths, with thinking running amuck between the two extremes. In other periods we feel detached from the whole of our time and even our human history and our thinking floats freely in the vastness of possibility and empty space. I do not think that our animal friends do that, or if so, not as we humans do.

I also do not believe that thinking is the same thing as “consciousness.” But thinking is surely one *kind* of consciousness. Consciousness is vague and permeates the living world, concentrated in organisms and perhaps even in poignant moments, packed with significance. Thinking is highly refined consciousness, brought to a point for a purpose—namely, action. But there is a second kind of thinking which is fairly mysterious. We call it “reflection,” or “reflective thinking.” That little voice that narrates to you while you are doing something, or that spontaneously comments on what you have done, or that even warns you when something is about to pose a danger: this is reflective thinking. It is also activity, but it feels like a secondary, even parasitic activity. Whether we could lose ourselves in some kind of pure reflection, empty our minds of active thought and dwell within an empty space of perfect reflective calm, this has been the aim of many gurus and mystics, and the goal of some kinds of meditation. It *resembles* what you must do in order to hit a baseball (or tennis ball, if you prefer) traveling toward you at a speed that challenges the limits of your senses, except that in such cases, you must silence both reflection and thinking and let them settle into pure action. Awareness is there, but thinking, reflecting, and acting become one activity when you swing at the ball.

As I said, it would be hard to capture a real thinking sequence in written words because the process would seem incoherent. Indeed, it probably *is* incoherent



in some parts, but the effect of this messy process is to compose or combine a being capable of both thinking and acting as a unified agent in the world, and to provide that being with a profoundly fragmented activity of projecting the future, occupying the present, and using the past –all at once, in an expanded moment.

Be Better

Everyone seems to agree that human thinking can be “better or worse,” which is to say, we can *attain* our goals in thinking or *fail* to attain them. Assuming that the attainment of goals is *better* than failing, the patterns of thinking associated with *successful* thinking become the “norms” for future thinking. We try to repeat in the future what has succeeded in the past, even though thinking alone won’t guarantee success in action. Think as clearly and precisely as you aspire to do and your actions may still fail. Think well but act badly (or at the wrong time, or in the wrong way) and you still fail to attain your goals. Think poorly and you might still attain your goals by luck (e.g., persuading someone of something), or because achieving those goals never depended on thinking clearly about them. Thus, the norms we find in logic are something short of being certainties as guides to acting, and least of all as reliable guides to persuasion, which is an art of its own.

The *relationship* between successful thinking and successful action is another area logicians consider broadly, but rhetoricians consider it as a matter of their specific professional calling. Some logicians believe that successful thinking draws its norms *from* successful action. Others deny this and suggest that the *process* of thinking is different from other kinds of action and needs an independent set of norms. Finally, most people believe that the relationship between logic and language is very important; some even say that logic is a kind of language that determines how we ought to use our natural languages (English, Spanish, etc.). Others say that our natural languages embody the structural characteristics of our thinking and that logic is responsible for distilling structural features of *successful* natural language. That’s a fancy way of saying that when we communicate successfully, the norms of that communication teach us the differences between good and bad thinking, and we want those norms to become our *rules* as well as our good habits. That is nearly indisputable. If something works almost all the time, teach it as a rule. But there is a problem.

Logicians who say this sort of thing usually believe that *all* thought is *discursive* –i.e., that we cannot think without language. That is surely wrong. We think without language sometimes, in images, and for some of us (like me) most of the time. I often ask students which of them think mainly in words, and that is most of them, but about one in ten is like me, thinking mainly in images. But whether we can *use* such image-thinking, or improve it, is a tougher question. Yet, sometimes we communicate well in spite of poor or unclear thinking, and other times clear thinking actually gets in the way of successful communication. I do not, for



example, believe that clear thinking about, and crisp formulation of, your past misdeeds will be likely to gain you forgiveness from your lover for those misdeeds, unless your lover is an unusual person. Telling him or her the details of how you were unfaithful kills the purpose of the communication, assuming you wanted forgiveness. If you wanted to torture your lover, I can hardly think of a better way than clear and detailed descriptions of that kind, but using communication to torture another person falls below our moral standards, doesn't it?

The point is this: Logic cannot guarantee successful communication and can even prevent it, under some circumstances. But knowing the logic is better than not knowing it.

EXERCISES:

1. Catch yourself in the process of thinking about what you are actually doing at some point before the next class (walking across campus, driving a car, cooking a meal, etc.). Try to write it down as Royce did.
2. Now, try to write the same experience from the standpoint of someone observing whatever you were doing in #1. What would someone watching you see?
3. Now, Imagine yourself as the reflective narrator criticizing or commenting on the account in #1 and jot down your reflections. Is it a good or bad description of a thinking process? Use your reflective power to streamline, clarify and improve the active thinking you described in #1, how it might have been "better" somehow –more efficient, better at anticipation, better informed about the situation, or the facts, and so forth. List the changes you would make.
4. Write an improved or "idealized" version of your active thinking that incorporates the reflective criticisms and changes in #3.



Chapter 2

THE WORLD OF ASSERTION

When Professor Royce was thinking about his quail hunt and his dog in the last chapter, he was thinking in complete sentences. Sometimes we actually do that, but only in our clearest and most explicit moments. I am more likely to think in complete sentences when I am alone and have almost *decided* to think. Royce is alone (with his dog), and has a quiet place (except for the quail chirping), and is uninterrupted in his interior monologue. He is not under any pressure to say anything. So, his mind has the leisure and the time to present him with a series of short, well-formed sentences. But notice this series:

“The brush is too thick. No dog could get in there. Yes, my dog could. He will go anywhere. But last month he failed to get through some such thorny underbrush as this.”

Royce is sort of disagreeing with himself, it seems, but really he is just considering possibilities and then adjusting and correcting



them. He isn't sure whether his dog can retrieve the quail from the bushes. But he sounds very certain in saying no dog could do it, and then, in flat contradiction that his dog can. The first sentence is a description. The second is an exaggerated judgment. The third adjusts the exaggeration and makes an exception. The third exaggerates the character and habits of a unique dog. The fourth is a memory that moderates the exaggeration. Royce says that all of these are "assertions." That isn't quite right. They became *assertions* when he wrote them down. When they occurred, they were the *suggestions* of thinking. Thinking does not assert anything because we are free to alter and contradict and adjust and rearrange our thinking without any "cost" –no one else holds us accountable, except ourselves, for having "entertained a possibility."

Much of our thinking entertains possibilities, and sometimes very quickly, other times more deliberately (as with Royce and his dog). Many of the possibilities remain vague and do not come to such clear articulation, even in our thinking. That is especially true when we are conversing or actively writing. We sort of "know and don't know" what we will say or write next. When we want to draw a thought into clearer order, to make it more explicit to our thinking, we might pause and formulate it, or we might just keep writing or talking to see what comes out. Sometimes we surprise ourselves (pleasantly and unpleasantly) with what we say and write. But when we do pause, we are providing just a moment for *the thinking* to form a *thought*. That thought might be a sentence or a clearer image. We may also consider that *thought* reflectively, and then decide whether to say it out loud or write it down. Look at the example again:

The brush is too thick. No dog could get in there. **[short pause]** Yes, my dog could. He will go anywhere. **[long pause]** But last month he failed to get through some such thorny underbrush as this.

During the pauses, the hunter is probably studying the brush, looking for spots a dog might enter, listening for another quail chirp, surveying the sky and landscape beyond, returning to the brush, then neutralizing his current senses in order to remember a similar situation (this is reflective thinking), and then returning to looking at the brush. What he is *not* thinking is that his dog is pointing, as such dogs do when a bevy of quail is within a few feet. As long as the dog and the hunter are physically still, there is time to think. The hunter does not expect *assert* any of what he is thinking, only to give a command to the dog to flush the birds. Here is an example of how it works.



<https://url.rylanbooks.com/xSwwp>

(trigger warning: actual quail will die in this video)

Now, I don't know anything about hunting and I don't aim to learn. But notice that hunters do a lot of thinking, deciding, and shooting, and not much talking or writing. That's why it's a good situation to imagine. Fishing and quilting seem similar. The consequences of *the thinking* the hunters do are near at hand, and the thinking is unusually explicit. We can see them (the hunters *and* the dogs) doing it. There is also an act of communication that indicates the decision, and in this case, one communicates with dogs. Assuming the dogs are well trained, they might sit pointing (communicating the presence of quail) for an indefinite period while the hunter decides what to do and how, perhaps working around to another approach where the birds' egress will pose fewer problems in collecting the carcass for supper. (We will get to supper in a moment.)

Now imagine the hunter saying out loud *all* of that thinking. Apart from spoiling the hunt, and the experience of "nature," it would sound silly. And what would be the point? It would undermine the purpose of the activity, in nearly every way. No one would accompany such a hunter twice. When we are in conversation or any other social situation, we suppress most of what we are thinking (thankfully); our thinking and our asserting diverge. The great philosopher Immanuel Kant (1724-1804) once mused:

It could well be that on some other planet there might be rational beings who could not think in any other way but aloud; that is, they could not have any thoughts that they did not at the same time *utter*, whether awake or dreaming, in the company of others or alone. What kind of behavior toward others would this produce and how would it differ from that of our human species? (*Anthropology*, Cambridge UP, 2006, p. 237)

It is hard to miss that our moral behavior would be very different, and that lying would be so easily detected that it wouldn't be lying: it would be error. I don't want to live with these beings any more than I want to accompany a talkative quail hunter. We all know people who are talkative and deliver TMI. We think hard before inviting those persons to dinner. They assert everything they think and have to deal with the consequences. No thank you. I'm glad I don't know Kant's imagined aliens. I mean, I don't want to lie, usually, but I also don't want to be held socially responsible for every little thought that forms in my mind. Movie makers have had fun with this idea in features like *Liar*, *Liar* and *The Invention of Lying*. Consider this clip:



<https://url.rylanbooks.com/ne7YK>

In this world, no one can lie, but they don't have to say everything they think. But with no lies being possible, the consequences of speaking candidly are greatly



lessened. And you can still have a pretty interesting disagreement, even where all of us say what we are actually thinking. After all, the future is yet to be determined. However, in discussing the past, disagreements would be quite different, not a matter of opinion (or, not as much as it is for us, who *can* lie), but of knowing the facts. History, wherever the facts are known and agree upon, would become just a list of assertions nobody could dispute. How boring. That isn't our world, of course. But we can make sense of the idea of having to say everything you think, and of reducing lying to error. That contrast with *our* world is important as a measuring rod for our actual experience. Things could be otherwise, and we could still make sense of it. Probably.

Multi-tasking

What about us, then? Instead of saying what we think, we oscillate very quickly between saying something, on one hand, and thinking something different or something more, on the other hand. We are editing, censoring, empathizing, anticipating, remembering, perceiving our surroundings (vaguely, because we are talking), and then preparing for a response. You can do all of this while you talk (it's a little harder and different when you are writing, but it's comparable). How does all this activity unfold?

Here is what happens: you commence speaking, anticipate what you will say and set that in motion, and then, while your mouth and voice are unwinding what you started, your mind moves on to what is next, while your powers of perception are on alert (in case you need to adjust what you were saying mid-sentence). You do this, many times a day. Now, compare: In order to hit a baseball, you have to shut down all of this other stuff and become just one swing of the bat-at-the-ball. You just can't do anything else. But you can almost (*almost*, mind you) text one friend while talking with another who is with you. It is rude, even if you apologize, but we've all done it. Generally, you'll text while you're supposed to be *listening* (which is extra-rude). But not always, because you can send your fingers into autopilot while making a simple sentence out loud, and then switch back and forth between typing and talking quickly enough to keep both processes going, as long as they are routine. You could even do all this while walking –please don't while driving, but we are all tempted, I know. The phone goes “ding” and we reach for it, just as surely as Pavlov's dogs salivate with the bell.

Talk about multi-tasking. It's a lot to do. Walk, talk, text, maybe chew gum. But you're used to it. Some people are better at this than others, but all of us reach a limit. When we can't handle one more task, we *must* pause, re-sequence the tasks, and start them back up, maybe setting one aside for later. Not all of these tasks require the same amount of oscillation. Having a very good conversation with a passenger while driving isn't difficult, or even better, with a companion (or two or three) while walking. Having a serious conversation on the phone, even hands-free, while driving is a very different and a much more demanding task. There



are reasons, neurological, environmental, and so forth, but that isn't our present concern. I just want you to notice all this, for now, and to observe yourself in operation.

The Main Dish

Making an "assertion" is like putting the main dish on the "table of communication." When your regular talking rises above the level of gab and suggestion and interjection, and truly *presents* something for others to consume, you have *asserted* something. Thus, your internal thinking and reflecting is a lot like the cooking process that your guests don't see—they are always in the dining room of our thinking, never in the kitchen. All the way from imagining the full meal (well ahead of time), to shopping and choosing the best produce and proteins and spices from the display, to sequencing the preparation processes (so everything will be ready at the right moment), to combining ingredients and spices, to tasting and adjusting to your taste, to plating and presentation, in all of this, your thinking process involves these sorts of complexities and choices. You can say things many different ways, with different words, in a different order, with variable emphasis, tone, circumstance, timing, and all of this has an effect upon how your assertion will be received.

Unless you are out hunting with your dog, or some other solitary activity, you are always aiming, socially, at the moment when the main dish is placed on the table, and you are not usually eating alone. Everyone wants to be taken seriously, listened to, answered, and to have the chosen words valued. Assertions are social, and that's true even when no one else is around. If you go to the trouble to *assert* something, even just to yourself, you have taken yourself as a guest at your own table of communication. Yes, *you* serve the dish, but then *you* sit down, and you aren't quite the same person in these two moments.

So, to assert something, is to *serve it up*. It needs to be fully cooked and it needs to taste good. It can be quail, if you follow my analogy, pounded out of the bush, plucked and cleaned and seasoned and roasted, or, if you don't like guns and meat, it can be picked from the garden of your thoughts. The analogy is the same: effort, imagining, searching, picking, preparing, and plating all precede serving. And once served, you can't un-serve it. Assertions are irrevocable events. You can say "I take it back," but that's *another* assertion. It doesn't change the earlier one, only modifies it.

Propositioning a Partner

If your aim is strictly limited to logic, that assertion is the *proposition* to be *established* by your *arguments*. Fully cooked. Thought through. I will define these new terms in the next lesson. But the philosopher A.N. Whitehead (1861-1947) defined a



“proposition,” even in logic, as “a lure for feeling.” So, without some connection with the ones who hear or read what you assert, some feeling for it, even the logic of an assertion is lost. To assert is to lure someone into caring about what you said or wrote.

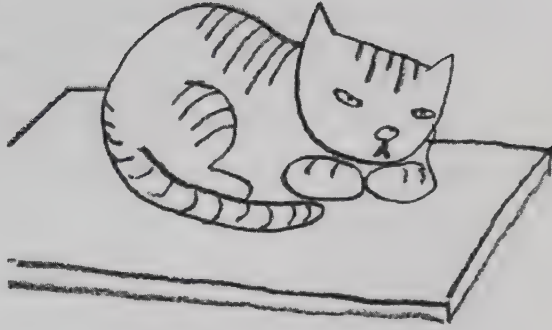
If you are aiming at persuasion, that assertion is the *conclusion* you want the *audience to act upon*. You want them to eat it and say “yum.” It isn’t enough for them to *believe* the food is good, or to believe it *would be* good if they tried it. Your aim isn’t fulfilled unless they eat *and* say “yum.”

While these goals are different, they overlap considerably, and *their form is the same*. As a persuader of others, you are always better off serving something “fully cooked,” which is to say that you need to know what it takes to establish your conclusion. As a logician, you must be aware of the *effects* of your main proposition upon all the other propositions you hold to be simultaneously true with the one you are arguing for, and to state that central proposition with as much clarity as natural language allows.

The Cat and Her Mat

So what does an assertion look like? You already know it very well. When you say something and people might say it’s true or it isn’t true, it’s like saying the main dish was tasty or disgusting. We would like to think that people could judge our assertions without bringing their individual tastes into it, but that will never happen. People will always mix their feelings and emotions with their judgments about whether what you say is true, or isn’t true, or might be true. People will defy the entire community of scientists and say that climate change isn’t real, or isn’t partly caused by human activity. They might assert repeatedly a hurricane heading north in the Atlantic Ocean from Florida will actually hit Alabama. Plain facts do not stop people from making assertions to the contrary. They will deny that it’s night when it’s night and that it’s day when it’s day, if they have purposes and hopes and aims that go beyond common sense or reason.

We can demand that they consider only *good* reasons, but it won’t matter. They will say they *have* good reasons and then we wander off into a half-baked discussion of what counts as a good reason. In the end, people will ignore us when their motives are strong enough. It makes little difference what they *should* do. We must work with what they *will* do. Now here is an assertion:



Source: <http://oculos.me/cat-with-flowers-clipart/>

You are not used to seeing an image as an assertion, but every image is. To serve up an image like this one requires a “cooking” process very much like to one I just described, but the images are usually less determinate than sentences in language. Still, when one is presented in a form like this –or on a website, or in a newspaper, or a billboard, or as part of a TV commercial, someone has served it up and it *is* being asserted.

In this case, I might respond to this image by saying “The cat is on the mat.” Logicians love this assertion for reasons that may never be fully understood. Maybe logicians are partial to cats, or simple rhymes, or to wiping their feet. In all likelihood, some thinker was writing one day, searching for an example, looked across the room, saw a cat on a mat, and now the rest of us are stuck with the results. But after all, sometimes the cat *is* on the mat (I have seen it myself), although, since anyone can see it, we are hard pressed to find a reason to *assert* it.

With this same image one might as easily say “the cat is on the board,” or “the board is under the cat” or “the line-drawing is on the page” or “the cat is a tabby” and the choices are actually infinite. It isn’t just a matter of imagining how to bring to assertion features of the picture itself. The picture also asserts the *absence* of everything it excludes. I could look at the picture and say “the color is missing” or even “the elephant is absent” and have a fair rendering of the assertion, under some circumstances. It isn’t hard to conjure a situation that makes those assertions sensible. Say, for instance, what if the last picture I showed you was the same one, but in color, or had the same cat and mat, but also an elephant?

It is very important for your health and happiness that you become pointedly aware that images, when presented, *are* assertions. People will control your emotions, thinking, and judgment with images, and if you do not devote yourself to seeing them as assertions, you will be vulnerable to being manipulated. If you see an image, *somebody* served it, and somebody wants you to eat it and say yum. Thus, that image is the conclusion of some process aimed at persuading you to do something, or at least to believe something that you would be willing to act on under the right circumstances.



The image may also be the conclusion of a logical argument, although it will be difficult to recover. Perhaps some marketing group has held focus sessions and determined cats on mats sell cat food better than cats on beds, on cabinets, on floors lacking mats, and other reasonable possibilities. Thus, they reasoned:

1. Cats on mats sell more cat food than other images.
2. We wish to sell more cat food.

Thus, we should present images of cats on mats to prospective buyers.

This is a fairly solid piece of reasoning. It has taken its meaning from the idea that selling cat food is the purpose of the assertion. If the purpose is different, the argument will be different. In the current case, for this lesson, the purpose is:

1. I want to illustrate that images can be assertions.
2. This cat-on-the-mat image will illustrate that images can be assertions.

Thus, I will present that image.

Now you will think I am trying to be cute or clever, which is true. But that isn't my main purpose. I want you to see the image and to be pointedly aware that it's there for a reason, and that someone put it there. You need to consider the purpose. You do it all the time and you often know exactly why an image is in front of you. But you go too fast. You do not often credit that it is being *asserted*, and that it might or might not be in your best interest to consume it whole, or to taste it at all. Some images, when you have taken them in, cannot be "unseen" or easily forgotten. It's best to approach images with some caution.

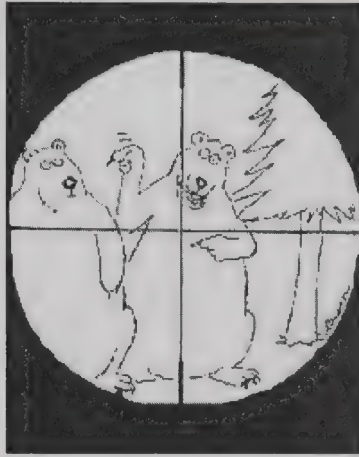
So why might one *say* (that is, bring to the point of assertion) "the cat is on the mat"? The answers could be many. Someone has asked "where is the cat?" Or someone has said "hand me the mat." Or someone is trying to get the door open, but the cat is in the way. Or someone is being warned not to trip over the cat-and-mat combo. You can invent plausible scenarios too: I say "the cat is on the mat" because someone has asked for my password, and I am asserting that this is the password by saying that same sentence. I could be answering someone who has asked "how do you say in English 'Le chat est sur le tapis'?" I could trace out the drawing of the cat on the mat in order to make my fellow student laugh in logic class.

In all these cases, something equivalent to "the cat is on the mat" is being asserted, but context, connotation, denotation, motive, and situation are being driven by my *purpose* in making the assertion. As my purposes vary, so does the best interpretation of my assertion, but (**and here is a rule to remember**), as for logic and persuasion, **if you don't know the purpose, you really don't know anything else**. You will never become good at either logic or persuasion until you have spent some time and effort considering the varied purposes that assertions can serve, and noticing how they may be transformed, adapted, distorted, re-associated, and that

all of this flexibility affects your judgment. Now, your *judgment* is ultimately what we are trying to improve in this class, so I will remind you regularly to consider the purpose of bit of language or image, what it's supposed to accomplish. You will be encouraged to think up *differences* of purpose so that you can have several interpretations before you to consider the more and less plausible.

EXERCISES:

1. Here is a simple image. It is being asserted.



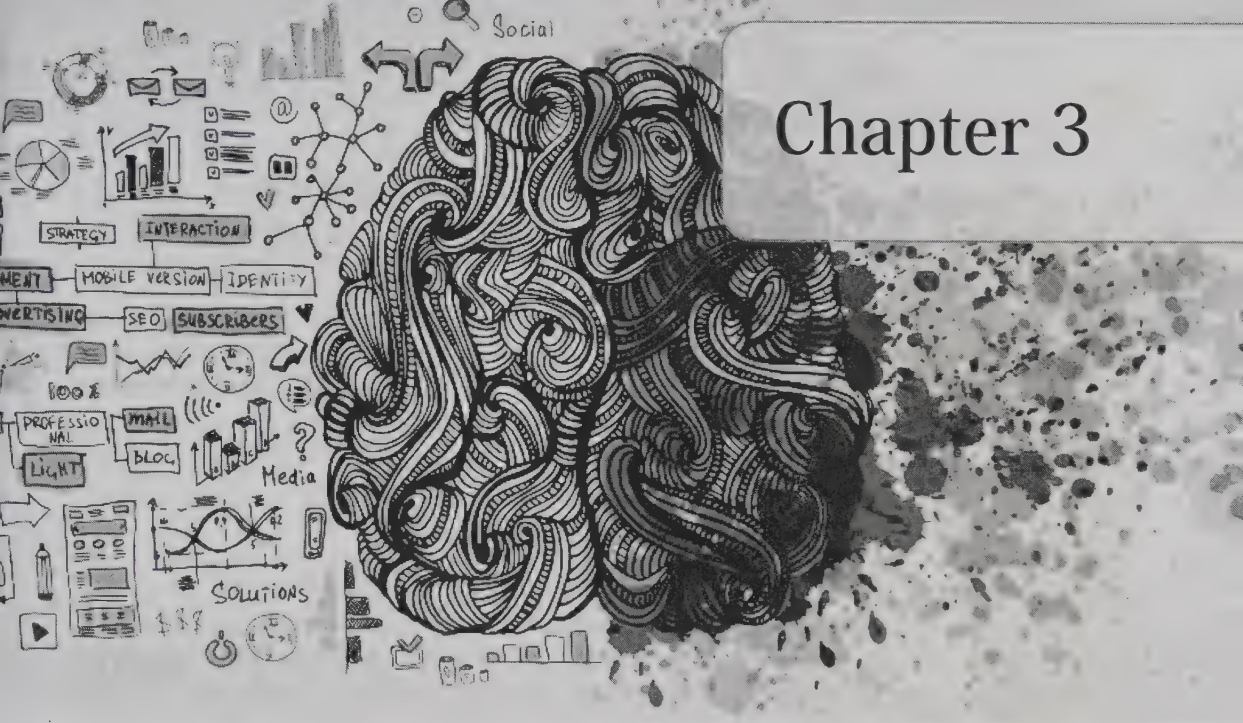
Source: <https://sites.google.com/a/gsd404.org/newspaper/home/jokes/rogen-s-joke-page/gary-larson-cartoons>

Make a list of purposes that might be served by asserting such an image.

2. Settle on one purpose and write down a single English sentence that you think is the conclusion, or the proposition to be established by this image.
3. Treat that sentence as an assertion that someone has said to you, out loud. It is the "main course." Before you eat it, make a list of other sentences that might have preceded that "presentation." How did just *this* sentence and no other come to be before you. Write down your best explanation, in a short paragraph.
4. Now: Do you find this main sentence to be something you should consume? Why or why not? Write out your answer in a short paragraph.



CHAPTER 2



Chapter 3

PROPOSITIONS

Lures and the Catch

In the last chapter we said that a proposition was a “lure for feeling,” which means about the same thing as a bid for your attention. A proposition is surely *at least* that, but it is more. Every “proposition” is also an assertion, even if there are also assertions (like some images that don’t compete for your attention) that aren’t quite propositions. So not every assertion is a proposition. Still, every assertion *can be made* into any number of propositions. The creation of a proposition from an assertion is the first step in **“the regimentation of language.”** That is an ugly phrase, made up by a philosopher with the odd name of Willard Van Orman Quine (1908-2000). He was often in a bad mood but very good at logic. He will come up again much later in this book. He realized that when we regiment our language, we *symbolize* it, and then maybe even force it into a “system of notation.” It’s like.



The way musical notes written down, represent tones and chords. But we'll get to that in good time.

The point is that when you put some thought or image into language, you symbolized it. Languages are already symbolic systems, as you know, but when you reduce our natural language (written or spoken or gestural) to propositions, you create a *second* level of symbols. These first symbols (spoken words, written marks, gestures of ASL) look a lot like regular English on the surface, but as propositions, they do have artificial *structures* imposed on them for very distinct purposes: logical analysis first, and eventually we do it to help us decide about how to enhance the persuasive effect of our language.

We must now enter into a process that will be a little bit painful. It's easy when you get used to it, but it's like learning to tie your shoes, which is actually hard to learn at first. Then you get the hang of it, and before you know it, you can do it from habit. This process of reduction to a second level of symbols, "propositions," and imposing more structure on our free-flowing language, is also the most important skill for getting a command of both logic and persuasion. We will transform our usual English into a more regimented form, and turn it into a set of symbols that are *substitutes* for what we would say in more ordinary English. Talking like Mr. Spock or Lt. Commander Data of *Star Trek* is close to speaking in "propositions"—no contractions, no abbreviations, no slang, no extra words, very clear subject and predicate declarative sentences. By this process, we can turn English into an infinite collection of propositions, written or spoken (or "signed" as gestures, which also works).

So, you will feel yourself objecting to this simplification of your meanings and communication. But endure that for me, will you? It doesn't have to suck. Forming a proposition is like a game. It's a bit tougher than checkers, though. It's more like chess. But before you can play any chess, you have to know the pieces and you have to know the rules. Let's do the pieces first. Chess has a lot of them, but the game of forming propositions doesn't. That game is the first "reduction" on our path toward regimenting language. We take anything that can be fairly called an assertion, and we reduce it to three highly simplified parts. The three parts are:

- **Subject**
- **Predicate**
- **Copula**

Stop snickering. I can't do anything about the Latin names. The first thing to know is that these names do not have the same meaning as the words you learned when you studied grammar and the parts of speech in English class. Same *words*, yes, but a very different meaning and application. We call these *parts* of a proposition,

the subject and predicate, “terms.” The subject term is whatever *gets* talked about, while the predicate term is the stuff you *say* about the subject. The copula is a relation between the two terms.

Subject Terms

Here is an assertion:

We should go to the movies.

This one is pretty clear. The subject term is “we” and the predicate term is “to the movies.” The copula is “should go.” We will get to how *that* works shortly. Reducing this assertion to a proposition will not be difficult. But we will still need to know the *purpose* in order to proceed. This reduction to a proposition can still be carried out in different ways, because the purpose will determine how we understand the denotation, connotation, and reference of the terms (more on this later, too). Further, the copula might have as many as ten different meanings, and our *purpose* in asserting what we assert will also help us decide which of these meanings of the copula we want to “propose” (to propose is to assert a proposition).

The subject can be compound. I might have said, “You and Bob and Carol and Ted and Alice and I should go to the movies.” All those people are still the subject term. The subject term does not have to be a proper name or a pronoun, it can be a description, such as “the person to your left should go to the movies.” It can be a collection: “Americans should go to the movies.” It can be a process as well as an entity, such as “manufacturing should go to the movies.” Admittedly this is strange, but subjects can be strange.

Pretty much anything that can be pointed to and given a name can be a subject term. For example, I can point to my cat and say “this cat” (to distinguish it from other cats, since the word “cat” includes many other cats) and it may serve as the subject term of my proposition. But I need not stop there. My cat happens to be orange, so I can even name the *sort* of orange that my cat is: “that orange is cheery orange,” and I can now use “cheery orange” as a subject term in a proposition: “cheery orange is rare among cats.” I can name even less obvious things, like the molecules in my cat’s fur. I don’t have to *see* them or actually point at something to name it. You need only indicate it in some way. “There is a certain molecule that is part of my cat’s fur, and I am naming it John, John the cat-fur-molecule.” You may now use John as a subject term: “John (the cat-fur-molecule) is quite small, microscopic in fact.”

I can also use abstractions as subject term: “the law of entropy is a party pooper.” One can point to the effects of entropy, and to mathematical measures of entropy, and to a lot of discussion about it, but finding the law, as an object in the world, will be tough. Yet, pretty much anything that can *answer* the question “what is it?” or “who is it?” or “when is it?” or “where is it?” or even “why is it?” can end up



being the subject term of a proposition.

What we have learned is that the subject term is not just a person, place or thing (like nouns are), it's a *function*. People get nervous when that word comes up. The next thing you know, someone is asking you the function of x so that you can offer them a range of numbers. I won't do that . . . yet . . . But your teachers probably never explained to you what a "function" is; they just showed you how it works in algebra or trig and left you to figure it out. I won't do that to you. To say the subject term in a proposition is a *function* just means that you have three parts to the proposition:

1 2 3 1 2 3
[Subject term] [is] [Predicate term] (or S is P),

and absolutely anything you can put in the role of a subject term (following the rules of forming a proposition, which we will get to shortly) will do just fine. The Subject function just means whatever the subject happens to be in any given instance, but since you can change it out for another, and make a different proposition, we won't call it "the Subject term," we'll call it the "Subject function," which means we are thinking about how it's interchangeable.

You haven't yet learned the rules (and limits), so let that go for a minute. But you do have some examples of what can be a subject term, so just generalize and imagine a blank:

_____ is P.

Fill in "The man behind the curtain," or "The square root of negative one" or "The temperature on the dark side of the moon" or "the Knights Who Say Ni" or "it" and then you have a subject term. But you filling it in? *That's* the subject function.

Predicate Terms

Now that you have a subject term, go ahead and say something *about* it. Your subject term is "the cat" and you say that it is "on the mat." As if by magic, you have just "predicated." It's legal, so don't be nervous. It's something you do informally a few thousand times a day, but we don't use the fancy verb "to predicate" unless you are being unusually formal about *saying something*. To predicate is to ascribe a predicate term to a subject term, and to do it in such a way as to be held responsible for whether you followed the rules for forming a proposition. You are actively *thinking* about this bit of language quite explicitly, and your *reflective* processes have approved of this combination of subject and predicate, while your actions are presenting the result, verbally or in writing or in gestures.

Yes, you are asserting something, but more than that, you are stating that the predicate term modifies or holds true of the subject term in some way that *others*



can judge. You have already made your own **judgment**, and if you are thinking well, you have your purpose clearly in mind. It is the reason you asserted your proposition. You know *why* you are offering this subject-predicate relationship, just here, just now, as a formal proposition. You are willing to have your proposition judged, formally, by *others*. It is far more than a sentence, then. It is more like testimony in court. You have done your best to eliminate ambiguities and you are trying to say something clear.

In general, you are also trying to say something true, but there are occasions, not very rare, when predication is used in order to say something that is known to be false, or something the might not be true but also might be, or something that might not be false but also might be, or something we just don't know about when it comes to whether it is true. We can predicate in order to wonder about something out loud, and invite others to judge. It is also possible to form perfectly correct propositions that are beyond our capacity to judge, such as "Time travel is impossible." You can assert that sort of thought as a proposition, but knowing that something is *impossible* involves knowing everything that *is* possible and then seeing that time travel is definitely not among the possibilities. That sort of knowing will not happen for beings like us. So we can't really judge.

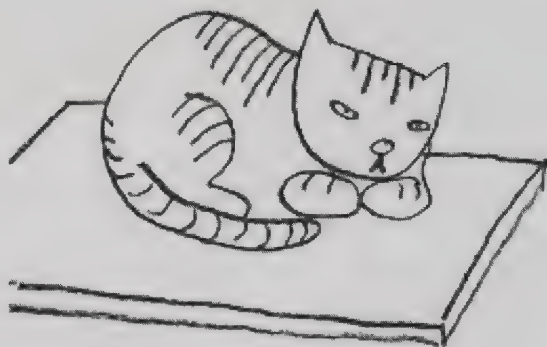
Asserting a formally correct proposition (one that follows the rules) by predicating some information of a subject term does not depend on knowing whether the combination (S is P) is true or possible or otherwise. It just depends on constructing the subject and predicate with a copula that joins them. Almost *any* words can be part of a predicate. You can say that "The Prince of Wales got in a coach, drove to Buckingham Palace, had tea with the Queen, brushed his teeth, played tennis with Camilla, slept soundly, awakened to his alarm, and did the same thing again." Everything after "The Prince of Wales" is the predicate term, except for the verbs, which are copulae. I like that way of making "copula" plural, even though Microsoft doesn't recognize it and I don't know whether it is proper Latin. I'm keeping it anyway. I could look it up. Maybe later.

The Copulae

Aristotle invented the rules for predication. He was about as clever as anyone who ever lived. He is on my top ten list of dead people I'd like to meet. I also have a list of people I'd like to meet who have never yet been born and probably never will be, but it's pretty vague—no names of course, but the subject term and predicate term are properly copulated. It includes "the person who truly understands *why* human beings so often ignore the best people and follow the stupidest." Yes, I want to meet that person. That is a well-formed sentence, but the copula needs some clarification. To get the rules for copulae, we must know how to copulate. Alright, you may snicker just a little.



Here is an assertion that is not so clear:



We already listed a number of assertions this might be making. In order to get any of these into a proposition, we have to investigate the word "is." Aristotle said that the word "is" has ten different senses. (He didn't actually say "is" since English didn't exist yet, he said "*ontos on*" which is Greek for "to be.") As you know the word "is" denotes the present tense, indicative mood, third person form of the infinitive "to be." Well, maybe you didn't quite know how to say that, but now you do. In this case, we might say "the cat *is* on the mat." And we may grasp our purpose as "answering the question 'where is the cat?'"

Now that we have that much done, we may look at the list of senses "is" has when we predicate. Here it is:

1. Substance (e.g., human, horse, rock)
2. Quantity (e.g., three yards long)
3. Quality (e.g., red, solid)
4. Place (e.g., in the market)
5. Identity (e.g., belonging to a class, like genus or species)
6. Time (e.g., last year, next week)
7. Position (e.g., sitting, prone, supine)
8. Condition (e.g., armed, happy)
9. As acted upon (e.g., is being burned)
10. As acting (e.g., burns, sits, eats)



Now, if we look at “the cat is on the mat,” we see that “is” might mean any of several of these, depending on purpose and context. See numbers 4., 7., and 10. These present themselves immediately as candidates for the meaning of our copula. It depends on whether our questioner meant “where” as in “what place in the room?” or “where” as in “in what position is the cat?” or “where” as in “what is the cat doing?” Admittedly, the last two are unlikely to be the questioner’s intent, but they make enough sense that we should not move too fast.

If the questioner had said “how about the cat?” and we answered “the cat is on the mat” our “is” might easily be 1 (it’s *the* cat on that mat), 2 (this *one* cat is on that mat, others elsewhere), 3 (firmly ensconced upon the mat), 4 (on the mat over there), 5 (an example of the cat species is on the mat), 6 (right now “is” but maybe not later), 7 (the cat is sitting on the mat, as opposed to lying on it), 8 (the cat is content to be on the mat), 9 (the cat was placed upon the mat), and 10 (the cat is actively staying on the mat, not leaving). There may be even be more than ten senses of “is.” But we can rest with the ones Aristotle sorted out. I’ll bet you never realized that “is” means so many things. But it does.

So, you see how important it is to be clear about your purpose? You don’t even know what “is” means until you have some purpose in mind, and if you and I have different purposes, we can miscommunicate even about this stupid cat. (Well, the cat isn’t stupid, we are.) Yet, there is more to choosing your “is” than being explicit about your purpose. And now we come to the most painful part: in regimenting our language, in creating a symbolic structure that takes the place of our daily language, we will treat every single verb as meaning “is” in *at least* one, and preferably *only* one of these ten senses.

You heard me: every verb means “is.” That includes was, were, are, will be, might be, should be, could be, shall be, might have been going to be, might have been going to have had to have been, and every variation of tense and perfection. We will reduce every one of the nuances or tense and mood to “is.” So “Grandmother was kind,” as a sentence we asserted, becomes “Grandmother is kind,” as a proposition. “The President should be smarter” becomes “President is smarter.” Obviously, the sentences, as asserted, mean different things from the propositions, but the propositions will make suitable substitutes for those sentences for the sake of logical analysis. Admittedly, this change of meaning from the loss of tense and mood is painful. It can’t be helped. The bottom line is that **a copula expresses a relation between the subject term and the predicate term**, and the clearer we make that relation, the better off we are (logically, not always in persuasion). In order to be clear, we need to look at the ten senses of “is” in light of our purpose, and make ourselves conscious of exactly what we mean.

We can restore the lost nuances of tense and mood after we have finished analyzing. Rhetoric is an art of nuanced meanings, but many nuances of language lie beneath the level of ornamentation and stylish expression. It’s about basics, like what “is” can mean. Some of the most important nuance is logical, and we must build that



subtle stuff back in later, one brick at a time. We can do the finishing work when the structure is solid. So, we reduce everything to “is” in order to make sure we choose the sense of “is” that we want, and that we really mean, and so do not confuse ourselves or anyone else about the meaning of our chosen copula.

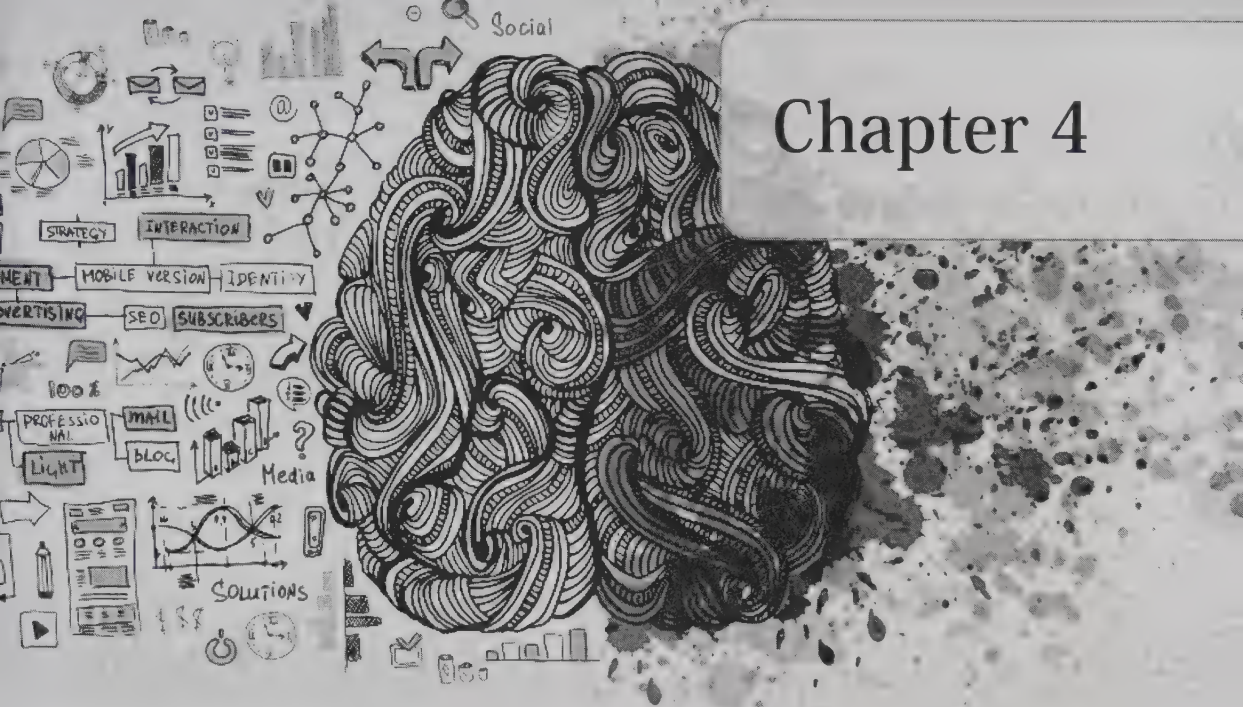
That’s all there is to the rules of this chess game. We may summarize thus:

A proposition:

1. . . . is a symbolic structure that substitutes for an assertion (whether the assertion is made in language or by means of a presented image).
2. . . . asserts a process or a state of affairs committing us explicitly to the relation the copula specifies between/among the subject and predicate terms.
3. . . . allows and anticipates a judgment from others about the relation between the subject and predicate terms.
4. . . . includes at least one relation and almost always least two terms, although the terms may be complex and compound.
5. . . . and the relation included is expressed as some sense of the word “is” and strives for as *little ambiguity* in that relation as the purpose of the assertion can accommodate.

EXERCISES:

1. Write down or draw the last thing you actually asserted (before sitting down to do your homework).
2. State the purpose for which you asserted it.
3. Identify the subject term in what you asserted and write it as simply as possible.
4. Identify the predicate term in what you just asserted and write it as simply as possible.
5. Reduce the copula to “is” and state the best sense of “is” from Aristotle’s list in writing.
6. Rewrite your subject terms, predicate terms, and copula as a formal proposition: S is P.
7. Pick up a newspaper and repeat steps 1-6 with the first assertion you see (probably a headline).
8. Turn on the TV news and repeat the exercise with the first assertion you hear.



Chapter 4

DENOTATION, CONNOTATION, AND REFERENCE

Judging

You now know the parts of a proposition. But if you want to assert something, especially *as* a proposition, you need choose a *purpose*, and you need to think that purpose, as a *thought*. Fully formed. Only then do you propose it in a more formal way for people to judge.

There is a tricky matter that may prevent you from getting the judgment you want from others. Remember, for logic, it is probably good enough if everyone *understands* your proposition clearly, and even that is a “judgment.” You hear a proposition, you think “yes, I understand.” You judged it comprehensible, clear enough. But for persuasion, clarity is less important than achieving an effect: a to achieve a willingness among those who hear or read your assertion to *act* on what you have said. That willingness is also a judgment. In fact, it is the strongest sort of judgment: willingness to perform an



irrevocable act. Once you do something, you can't go back and undo it.

That kind of judgment is difficult to inspire, even in people who agree with what you say. Agreement is a much softer (and less serious) sort of judgment. Just because I agree with you doesn't mean I'm going to do anything about it. The range of judgments from "I understand" to "I agree" to "Let's do it now" is a very important series of differences, and the differences shade into each other. Many people don't think consciously about which judgment they are making. But they are judging.

We usually judge assertions without troubling ourselves to make them into propositions. But there are good reasons, sometimes, to take the trouble. Let me start with an example where you usually wouldn't make a proposition, but you *could*.

Let's say someone just said "it's going to rain." You might say to yourself, if you are thinking about your class: "Hmmm, an assertion. How do I get that into a proposition?" And you rather easily see that "it" is the subject term, but sort of indefinite. Indefinite pronouns are no good for logic. So you say, ok, "it" means "the weather." Then you see that "to rain" is surely the predicate term, and that is clear enough. And then you see that the copula, "is going," indicates future tense (once you get rid of the contraction). With propositions, every copula comes down to some sense of "is." We learned that in the last chapter.

You now check the senses of "is" that Aristotle gave us. Look at the predicate and the subject and ask yourself "what kind of 'is' do we have here?" Is "to rain" a quantity? No, this sentence is not about how much rain. A quality? Maybe, but it doesn't seem quite right. Is "to rain" a substance, like me, or you, or Oprah Winfrey? No. It's a bit too ephemeral and transient for that. The water might be a substance, but the raining of the water isn't. And so on, down the list, until you get to the very end and realize that "to rain" might be a number of things, but really, we have to choose between "as acting" and "as acted upon," categories 9 and 10. Here we can consider whether the weather is acting on the world, and if so, that is the main sense of "is," or whether the world is acted upon by the weather.

Which of these feels right, when your companion says "it's going to rain"? Grammatically it's 9. The weather is acting on the world, since "the weather" is the subject term. But to be sure, you may need some clarification from your friend. You want to be certain you understand the *purpose* of the assertion:

"Excuse me, dear companion, but do you mean that we and others shall be rained upon, or are you simply carrying on about what the weather will do in the near future?" Your companion will now look at you as if you are from another planet: "Who cares? It's the same." You will then need to say politely that there really is a difference between acting on something, and being acted upon *by* something.



You may use Aristotle's name if you want to seem like a total nerd, and explain you're doing this for a class you are taking. You have learned some new and disturbing things about the word "is." Since your friend has been unclear, to this point, about whether the intention of "is" meant "as acting" or "as acted upon," and since you want no confusion, you are inquiring after the purpose of the assertion so that you can form a proposition that will satisfy your teacher.

Your friend now plans to seek other company, perhaps, but will surely say "I mean both, duh" and may perhaps add, "you dweeb." You have pressed your case as far as common conversation will tolerate . . . no, you pressed farther. But you have *not* yet succeeded in making a proposition.

Now, I need to interrupt this. That is why I have changed fonts. You are reading too fast. You need to slow down. What I was just telling you is something you will need later. You need to learn how to form a proposition. You can't get past this point without learning that. **Are you hearing me? You have to do this.** There are exercises at the end of this chapter, but you don't want to blow this part. You'll end up behind in the next chapter and then you won't graduate and you'll have to work at McDonald's. I'm serious here. It's ok to work at McDonald's while you're in school, and you must never underestimate the people who do this service, but you wouldn't be reading this book if that's what you had in mind for yourself. So pay attention and get to work. You need a proposition. The McDonald's guy doesn't need anything except "you want fries with that?" And that's a proposition, by the way: "fries is, included."

Ok, I'm back to the regular font, but that doesn't mean you've done your job yet. Without a proposition, you will never be in greater command of your friend's positive judgment, and you'll never have the crucial puzzle piece in the grand jigsaw of your own future professional life. You have already succeeded in obtaining a negative judgment from your companion, but that is *easy*. If logic and persuasion were only about getting a negative judgment from others, we could manage that in a few pages. Your aim is to get understanding (if your purpose is mainly logical) or action (if your purpose is persuasion). Again, these two overlap, and for any ethically decent person, they almost always overlap. You don't want people carrying out actions they don't understand unless the situation is dire (maybe you have to describe to someone who has never flown a airplane how to land due to an incapacitated pilot, or tell someone how to administer an emergency shot of glucagon to a diabetic's liver). But most of the time, I desire is that those we instruct or inform or persuade should act freely in accordance with shared understanding.

And here we come to the problem. Somehow, some way, your assertion not only has to be *about* the world, it also has to "hook on" to the world in a reliable way. Success in getting our assertions to hook on to the world is variable. Most of them do it well enough for practical purposes, and often we do not need greater clarity. We don't need to know whether "is" means "as acting" and "as acted upon" when someone predicts rain. But there are countless situations in which that difference is



enormous. When Ronald Reagan once said (in relation to a scandal) that “mistakes were made,” you had best believe people wanted to know who acted and who was acted upon. Until they knew, they were not able to judge the assertion and act accordingly. It wasn’t clear what the assertion *referred* to. Reference is that “hooking-onto-the- world” aspect of a proposition.

Reference

Unhappily, philosophers, linguists, logicians, communication theorists, and many other very smart people wasted a century arguing about what reference really is. They almost never paused to consider the *purpose* of the question. They would have done far better to ask *how* reference *works*—and many people did ask this question, but they were mainly pushed aside by the people who wanted to know “what.” Those pushy people treated “reference” between language and the world as a sort of “thing” that could be studied like atoms and grizzly bears and brain tissue. If they knew what a successful and unsuccessful instance of reference was, it was like having a specimen of a grizzly bear to dissect, and then these folks could have a true “science” of language. That was what they thought wanted: a science. We would never again need to worry about how people *felt* about the things they say because we would know exactly what was included and what was excluded from their act of asserting. If they were right (and they weren’t), then, when we have the whole reference, we would have the whole of what anyone could *possibly* mean, and without all the messy emotions and individual perspectives, and different histories. People used to think that would be a good thing, to be without all those perspectives and feelings.

Much evil came from this kind of thinking. Let’s not repeat it. This was a bad idea from the beginning. You wouldn’t want to live in a world that told you what *you* mean by showing you everything that was included and excluded by your assertions. Even a Vulcan wouldn’t want that world, although it was (for that imagined race) an ideal they pursued. As you no doubt realize, the cost to your prospects for happiness would be severe, and it would be a lot like the conversations in *The Invention of Lying* we already considered.

But there is another reason that reducing our meanings to our “references” was a bad idea. It is unempirical. (Now you say, “oooooh, unempirical,” gasp, like we are watching daytime trash tv.) We do not intend, by every assertion we make, to be picking out some “thing” in the world. Communication is much broader than reference. Reference is needed sometimes, for sure, but the purposes of communication far exceed reference to the “objective” world. The people who wanted all of logic to be the study of how “reference determines meaning” (imagine a dissonant musical chord) had a name for their system of logic: “extensional logic.”



These beasties and Monsters of Main Street said “the extension of a term is whatever it picks out in the world.” So the extension of “cat” is all the individual cats, and so on. Like The Blob absorbing all it touches. Things got squirrely when it came to historical beings and fantastic creatures (like Blobs from 50’s movies, and does “the present King of France” refer to anything in the world? Does “this unicorn” refer to anything? Etc.) To be honest with you, this sort of question is a waste of time and energy. Anyone who tells you otherwise wants to play games, not communicate. Any logic worth doing leaves such questions in the 1950s.

But what, then, is reference? How does language hook onto the world (when that is a part of our purpose), and how does it fail to, and how does the kind of language we transform from assertion to proposition stand in relation to the world?

Surely you felt, when you questioned your companion, that you were moving away from the practical world when you wanted to know whether the purpose was to inform us of whether the rain was “as acting” and the world was “as acted upon,” or whether the term rain was in the sentence so that we might act upon the world so as to remain dry, or some other purpose. The reason it seemed removed from practical concern is that it all comes to the same thing, regardless of which sense of “is” your companion meant.

But there are many times when we really must know with greater clarity which sense of “is” has been invoked. When that is needed, it is very practical to request clarity. In logic, that clarity is always needed. Always. If you don’t what “is” is, logically, you don’t know *what* you are talking about, you don’t know *how*, and you don’t know *why*. Purpose is all.

Recognizing that we don’t always need (or want) greater clarity, we also need to be in a position to get that clarity *when* it is needed. That is what the formal analysis of language enables us to get. Yet, thinking about the “extension” of a term (what it picks out) is only one part of the story, an important part to be sure. Thus, we need a working, functional set of procedures for finding the reference of a term when we want to, but that procedure needs to *conserve* all of the meaning that our assertion might hold and condense it into our proposition. It’s a tall order.

Almost every logic book I have ever studied (and that is many, I am sad to say) has messed up this problem, leaving students confused about reference and meaning. I will not be very popular with my peers for saying this, but perhaps they will hear me out. I hope so. I do not think that reference wholly determines what we mean and I do not think our intentions or mental states wholly determine what we mean, but I do think that our *purposes* are a fair touchstone for working out both reference and meaning. I think we have to accommodate both meaning, on its own terms, and reference on its own terms. I think that what we mean and what we are talking about live, move, and have their being in our purposes.

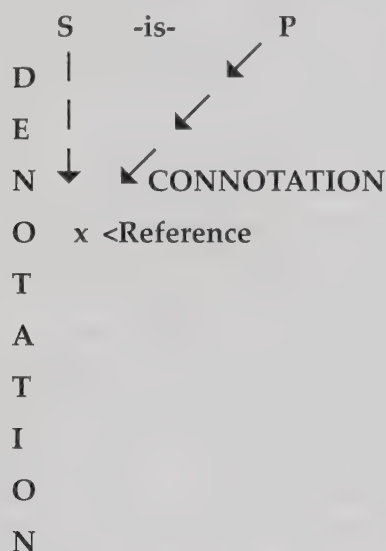
We learn about this situation best when we have some resistance to what we say, and when we have some opposition to achieving our purposes. There is no greater



opposition in the world than when another person is in front of you: one who will not do what you want. You could resort to violence, intimidation, or threat, but persuasion is the decent and humane way to achieve your purposes. If you count on logic to do this work, you must think that Mr. Spock is your companion. No one I have ever encountered, except a few (very few) professional philosophers, was ever convinced of anything by logic alone.

Denotation and Connotation: The Functional Field of Reference

There was one fellow who developed a way of solving this problem of meaning and reference that is adequate to our task. His name was Delton Thomas Howard. (Not Dilbert, Delton.) No one today remembers him. But he taught at Northwestern University in the middle of the 20th century. I am using his procedure, modified somewhat for my purposes, which are different from his. He noticed that not assertions but propositions were the key to understanding meaning and reference. So, if “S” stands for the subject term in your proposition, and “P” is your predicate term, here is the basic idea:



The subject term provides the denotation, but that alone is not reference. In order to refer to something, you have to provide a context in which that thing is found (or is *not* found, but we will get to that later). Without the context, there is no clear purpose and without a clear purpose there is no clear meaning. Purpose and meaning are both required for successful reference.

So, as you can see, the predicate term is providing the field of “connotation” for the proposition, while the subject term is providing the “denotation.” Without



both denotation and connotation, it will not be possible to sort through what “is” means, and unless we know what “is” means, the reference is too vague to help us. We cannot, with full understanding (and usually will not), act on what is too vague, and that, friends and neighbors, is the measure of whether reference has succeeded. You assert something, and someone responds by acting on it, freely, and both your logic and your persuasive powers have found their mark.

Successful Assertion

To act on an assertion so that the assertion has “succeeded,” we must act freely. Now, that’s a complicated thing to think about, and we don’t have time. But it’s always safe to just rely on Aristotle. Aristotle said that in order to act freely (not by force or under compulsion), we must *know* certain things. The requirements for voluntary action are these (note that I change fonts to keep you on your toes):

1. we must know who is acting (the *subject* part, me, you, the cat, etc.)
2. we must know what deed we are doing (that is, the *predicate* part: raining, talking, wrestling, etc.)
3. we must know what object or person is affected by the act (also part of the *predicate*, like the world, the mat, the lamppost, etc.)
4. we must know the instrument(s) or procedure(s) with which the act is done (the water, the wind, gravity, etc., this is related to the *copula*)
5. we must know the purpose(s) of the act we undertake (to stay dry, to describe a situation, to annoy our companion, etc., this part comes from we will call *naming the beast*, see below)
6. we must know the way or manner in which it is done (gently, or slowly, or quickly, etc.; this helps us find the meaning of “is” in the assertion)

You can see, I’m sure, why it is so hard to persuade someone to act. If people are not sure about any one of these six considerations, the acts are not fully their own, not wholly voluntary. Now, we sometimes do things “on faith,” trusting that we understand *enough* of what we need to know to let the rest work out in the wash.

But a good logician considers all the possibilities and a good persuader chooses (based on an understanding of the audience) which of these six is obvious enough, without needing to be made explicit, and which ones simply will *not* be acted upon unless it is made clear and praised or defended.

To know what one is talking about, then, is to know how subjects and predicates work together to provide a sense of “is” that serves the purpose of the person who asserts. (Don’t make me repeat that, just read it again, ok?) That means a sufficient power of determining denotation and connotation *together* is required. And that



means that *making* our assertions into propositions (which is your new job), and then tracing them into their field of reference with adequate success.

Consider this:



<https://url.rylanbooks.com/u2umP>

Why is the instruction so difficult? These guards miss one or more of these six, in turns. Any failure here will prevent them from judging rightly and acting accordingly. You can go through the list above and watch the video and have some fun counting the failures and listing them by which (1-6) factor has been missed. Sometimes it may be more than one.

In fact, why don't you do that now. Start over every time the Lord of the Manner turns his back to leave. I will wait.

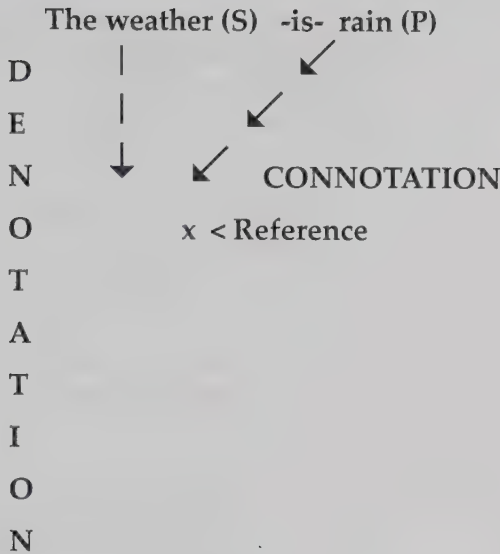
Now, look at your list. Do you see how much can go wrong with even the simplest assertions? How can you be sure that the beast you named is the one the speaker *meant* you to name?

Answer: you can't be certain, but you can do better rather than worse. Act on what you think the reference is, and see what happens. If you are badly off base, you'll probably find out quickly. Just like these guards.

Fully Contextual Reference

Let us return to our earlier example. Our companion says "It is going to rain." We have "The weather" substituted for "It" (you *always* replace pronouns with the full noun), and we have "rain" as the predicate term. We say to this companion: "The weather is rain." And we privately (and dweebishly) think "either as *acting*, in which case rain is a process with some power to act, or as *acted upon*, in which case the weather itself has the power to act on us, or the world, or the plain in Spain." Our companion says: "that is what I said." You reply, "no, friend that is what you asserted, but I have said all that you could reasonably have meant. Now, may I inquire as to your purpose in asserting that?"

If the purpose should turn out to be something wholly different than we supposed, we might have to return to the senses of "is" and rework the proposition. But what we can say with greater surety is this: if the purpose, once stated, confirms our assumption that the world was about to be acted upon in our immediate context, then we might press onward to something more complicated, such as "what do you suggest we do about that?" Perhaps we must cancel the picnic, take an umbrella, delay our departure, or some further purpose, but at least we have gotten clear about "The weather is rain."



The Aftermath of Referring to Something Meaningful

You may find it interesting that the reference is not a “thing.” It’s a situation. But it is very clear that the purpose of the assertion is to draw attention to a situation, not a thing. *Good* reference has no difficulty referring to situations, and good reference need not turn situations *into things* in order to refer to them successfully. Situations, like so many other aspects of our experience, have indefinite borders and are not themselves clear enough to be treated as things, but they are plenty clear enough to be referred to, for understanding, agreement, or action.

Naming the Beast

But reference in this sense is a bit odd because it may not have an easy name. (This will get worse before it gets better, but it will get better, I promise.) There were a couple of pretty loopy British academics named C.K Ogden (1889-1957) and I.A. Richards (1893-1979) who suggested that a “reference” is a sort of mental image, and it is different from the “referent,” which is the thing in the world it is an image of. They were basically saying what I have been saying, except that I want you to think of it as a feeling down in your gut that you’re trying to work into an image in your head. In any case it’s quite hard to name it.

In this boring example I just gave, I might say the reference is “Our weather situation in the near future, with respect to making needed preparations.” Or I might just simplify it to “imminent weather problems” which is more general, since it might include more than just rain. But naming the reference is a really important act for anyone who wants to use logic or to persuade anyone to do anything.



Struggling with the “what” and “in what context” of someone’s assertion (especially your own) is the true key to finding a logical ground and hitting home with the logical and/or persuasive intent. You can call it “naming the beast,” if you like, because that’s about what it is. We put a name to the bottom line, to what the subject, predicate and copula do together. That’s your *proposition*, dude.

Becoming very, very clear about your reference is second in importance only to knowing your own purpose, in both logic and persuasion. So you must practice naming the beast, and it is tough. The beast is a vague amalgam of your subject, your predicate and your copula. It doesn’t want a name, and its name will be ugly, when you find it. Make no mistake. The better you get at doing this, the better you will be at both applying logic and at persuading other humans (this will not work with your dog or cat), and at formalizing language.

Now, assuming you are my companion (and I am your very particular, skeptical friend), and if you want me to *do* something about the assertion “it is going to rain,” I may also need the answer to all six of Aristotle’s conditions. We also have to deal with the fact that I may or may not agree that it really *will* rain.

I have said that my purpose in this book is to slow down your thinking so that you can catch a glimpse of it. You might never have been through a process as explicit as turning your assertion into a proposition, and then naming the beast, that is aided by having an explicit, functioning reference. Yet, all of this is implicit every time you make an assertion and expect anyone to *understand* it fully (let alone agree with it, or act on it).

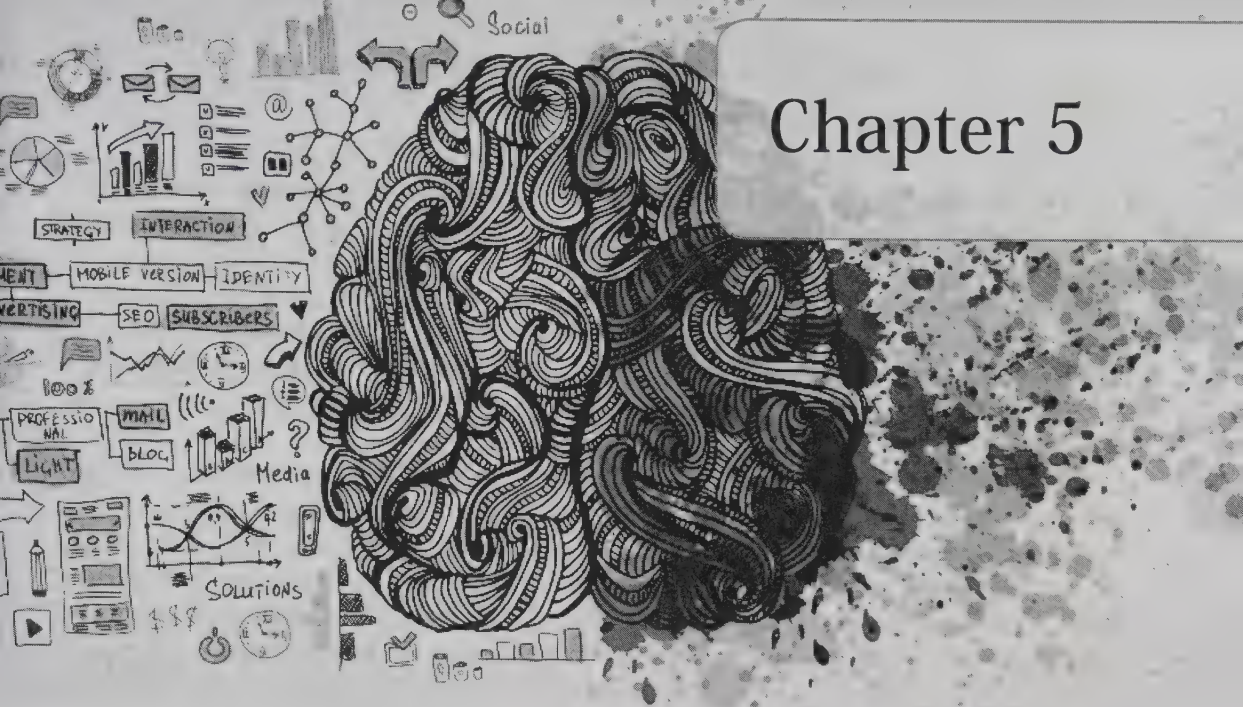


EXERCISES:

1. List the next three assertions you hear or see. (Check your Facebook or Instagram or whatever you kids are looking at these days—they're full of assertions.)
2. Turn all three into propositions, as in the previous exercises in chapter 3.
3. Using the power of purpose and the best you can do with the ten senses of "is," provide a phrase that *describes* the denotation of the subject term (what *would be* picked out in the world by that term) and the connotation of the predicate term (the field of meaning presumed by the asserter's choice to bring just that predicate together with just that subject). This requires interpretation on your part. You could be wrong, but that's alright, so long as your interpretation is plausible.
4. Make a scheme of each subject and predicate like the ones in this chapter. (Use the arrows.)
5. Provide a word or phrase for the reference of the whole proposition. (That is, *name* the beast.) This often requires imagination on your part. Sometimes the reference has no obvious name, but usually if you let yourself imagine, a word or phrase will come. For example, if the real meaning of our example is that we will be rained on, the beast might be "the-weather-will-make-us-wet."



CHAPTER 4



Chapter 5

INTERPRETATION

So far you have learned to notice yourself forming *judgments* about assertions and how they may best be transformed into formal propositions. Now that you have done that a few times and practiced it, it's time to learn to notice *how* you do it.

In order to evaluate an assertion and move it into the form of a proposition, you have to decide *what it really means*. That can be done better or worse. You do it every time you answer somebody. They say "do you want fries with that?" and very quickly you think, purpose, "to sell," and "fries is available," and then you look at denotation, "actual fries," connotation, "stuff on the side," name the beast: selling-me-more-food-to-eat-with-my-already-unhealthy-entre." Then you answer: "no thank you." You do it successfully every hour of every day.



Not all assertions are as easy as that example. Some people have a natural gift for accurate interpretation of what other people's assertions mean, while other people have to work harder to "get it." You are surrounded by assertions, all day when you are awake, and probably there are some assertions even in your dreams. People are talking to you, texting you, and images are everywhere, and bits of text, like slogans and headlines, opinion columns, podcasts, radio ads, and whatever else comes in on your cell phone or computer.

Pretty much everybody who puts an assertion out there *wants* something. Maybe they just want you to be informed and are performing a service. Most of them want you to do something: buy, sign up, show up, contribute, or, at the very least, *believe* what has been asserted (so that you can store that belief in your mind and heart for future action). Getting what they want depends on getting you both to *understand* what they're asserting, and to *get* what they want from you.

You are *interpreting* when you do this. It takes a little bit of effort. For the most part you go around taking all this in, knowing what it all means and what the asserters want from you, and mostly you just pass it by. Once in a while an assertion catches your attention and you devote more serious concentration to understanding some details about the assertion. You might want to consider whether to *act* on that assertion.

In effect, you are shopping in the "department store of assertions." The shelves are well stocked, but your interest is focused in a few departments, related closely to your immediate goals. Because you bring the focus of these *purposes* to the store with you, the range of assertions you will be willing to *interpret* is not that wide. In order to be pulled out of your mindset and into something completely beyond your current purposes requires an extra-ordinary effort on the part of anyone asserting something.

Your Busy Day

For example, you have a mental list of things you need to get done today, and you know which ones are most pressing and which can really wait until tomorrow (like those papers I need to grade). These are the purposes you bring to the department store of assertions. Let's say that today you need a gift for your mother's birthday, some plan for supper, and some cat food for that critter on the mat, gas for your car, to return two phone calls, answer your e-mail, finish your logic homework, and the plant in your apartment is dying for reasons you can't figure out (maybe the cat left the mat when you weren't home, and, well, you know . . .). That's a fair list. That's you today. It isn't going to be easy to get your attention unless it's about one of these things.



So you are wandering downtown, on your way to the store, thinking about the relation between the cat and the plant, and you pass by a street-corner preacher who is talking about how *you* should repent. That fellow has a tall task if he wants a piece of your time. You are busy. But as you pass, he points a finger right at you and fixes his eyes on you and says in a loud voice “YOU! HAVE YOU REPENTED?!?” The three people who had paused to listen are also now looking at you (and feeling relieved that you and not they have been singled out).

Well, he addressed you directly. Now you are going to have to deal with something that wasn’t among your purposes for the day. You know your choices. Look away, speed up your walk and don’t look back. Pause and gesture in defiance. Return the question sarcastically. Answer frankly (yes or no). Engage the fellow in a theological debate. And so on. Your response will emerge from your mood, your history, your beliefs, your momentary circumstances and a thousand other tiny contingencies that all converge on this moment.

A Moment’s Pause

But what does he really *mean*? You think it’s obvious, but slow down a minute, ok?

You notice, I changed fonts again, right? That means you’re falling into your bad reading habits again. Snap out of it.

Ok, now that you’re awake, let me tell you something: What you are not likely to do with Mr. Preacher is a formal analysis of the question he asked. Behind every question, every declaration, every interjection, every exclamation, every command, every image, every gesture, there lurks a declarative sentence.

You learned the four kinds of sentences in English class: declarative, interrogative, imperative, exclamatory. But the teacher probably didn’t say that the simple declarative sentence, in the present tense and the indicative mood, can be offered to replace the other three types wherever they occur. But you can do it, with a tiny bit of effort.

You just *interpret* the meaning and supply the sentence. The preacher’s question “have you repented?” probably comes down to “you should repent.” And you *know* that, without having to *say* it as a declarative sentence. But say it for me, okay? Now, formally? “You is_{10} repent.”

And if the preacher gave you the command “REPENT!” that also is “you should repent,” isn’t it? If the preacher should request, kindly, “please repent,” the declarative sentence is still “you should repent.” And even if the preacher should exclaim “Oh that you would repent!” it comes down to “you should repent.”



You know all this, no matter how he says what he says. Because you know what people like him want, what their *purpose* is. They usually want money, first and foremost, and they also want to feel like they have changed people to their way of seeing things.

His question is an assertion, and the essence of that assertion lies in the sentence “you should repent” for the purpose of the unstated “(and then give me some money).” You know all this by *an act of interpretation*. That’s why you probably won’t ask him “what do you want from me?” First, because you already know; second, because it encourages him to expand on what he already said; and third, because you are busy and this wasn’t on your list. (Keep this in mind for later.)

The Good News

Your powers of interpretation are already excellent. But think about this: how *quickly* do your powers converge on the most perspicuous response?

Is it not clear that the best answer (for closing the conversation with this annoying preacher) is a simple “yes”? But will you think of it? Behind this “yes” is an assertion. “I have repented.” And behind this, an unstated purpose “Yup. Repentance R Us. That’s me. Now, shut up.” Thus, an assertion meets an assertion, his and yours. “Yes” leaves him with nothing further to say. It encompasses the whole situation, takes into account how busy you are, gives the preacher what he ostensibly wanted (but clearly didn’t expect), and leaves everyone ready for the next activity. If you flip him a quarter as you leave, you could really prevail here. That’s the good news: everyone can win here, sort of.

But now, here’s the inevitable bad news: You may not want to say it unless it is *true*, and here we come to the main issue of interpretation.

Success and Failure

In fact, there is very little point in thinking of *assertions* as either true or false, even in logic. Rather, assertions either succeed or fail. First, assertions can be formalized in several different ways, into different formal propositions, and whether the proposition is true may depend on how you form it into a proposition. And second, assertions often succeed in spite of whether they are true, and often fail even when they are true.

The success of an assertion depends upon whether it achieves the response that was its *purpose*. No one asserts anything without having some purpose, even if

the purpose is mundane –just to inform you of something, for example. The way philosophers say this is that “all action is teleological,” which is a fancy way of saying that all action (including speaking and writing and gesturing) aims at some goal or some outcome. If the outcome is achieved, the action succeeded. If it was not achieved, the action failed. Assertion is a kind of action.

There is a broad range of goals a person might embrace as “success” in making an assertion. Many of the images and much of the text clamoring for your attention every day fails if *you* pass it by, because you were the target audience. But most of that stuff wants more than attention, it wants you to do something –watch some show, buy some kind of mouthwash, go to some meeting or show. But if the assertion doesn’t get your attention it surely also fails in eliciting the desired action. So maybe you noticed it, read it, even clicked on it, but then didn’t do what the assertion really aimed for. One could claim partial success, and consider whether the assertion can be re-packaged so that you would go further, next time.

On the other hand, maybe that assertion wasn’t aimed specifically at getting *your* attention. The attention of the target audience was aimed at, and their daily list of activities (where they go, what they buy, what they worry about, and so on) has all been considered in crafting and placing and presenting the image or the text or whatever form the assertion takes. Whether the assertion is *true* is not the primary concern. Whether it *succeeds* is primary. In order to succeed, the image needs to elicit action (beginning with drawing attention) from those who were chosen for the presentation. There is a declarative sentence behind that assertion and it’s telling you what you should do. You see an image of a tube of toothpaste. It means “buy this toothpaste.” (Why is the tube always full in the image?)

The preacher was careful enough. He chose you and staked his whole outcome on your response. Almost no matter what you do, he can turn his assertion to success for the people he was really targeting, which was not you, but the other people listening. You may be quick enough to see the situation for what it is, realize clearly that whatever you say, it is also going to be a part of the preacher’s goal in performing an extended assertion for those listening, and, even if it is not true, handing him the simple response “yes,” delivering it convincingly, and then proceeding on at a normal pace provides everyone, even the preacher, with a kind of success, although the preacher will have to hold it privately as a failure, since it prevented the further discourse he aimed for.

Annoyingly Clever People

All this is done by *interpreting* assertions, and that is what we all do so well and so quickly and so habitually that we barely notice. But all of us have friends who are quicker –they more quickly understand a situation, see all the “moving parts,”

grasp the immediate past and foresee the immediate future, sort through the available responses, decide whether to be kind or snarky or a bit wicked, and deliver, in the most admirable economy, just the zinger that will turn the situation to everyone's best interest, including the people who had other, self-interested goals. The words may be funny, clever, defiant, sharp, or take on any number of qualities, but it seems almost magical that some people can do this so well. We can all picture right now the person we know who does this best. And all of us have our own moments, but not many of us enjoy this seemingly magical power of rapid and accurate interpretation.

I confess, I am not usually quick like the people I envy, but maybe quicker than some who envy me, I suppose. But there is good news for ordinary folks like you and me, who are not the great wit or the clever one. The gifted ones have a much harder time learning *how* they do what they do than people of ordinary interpretive ability, like us. We can learn to get better at it because we are so well aware of our limitations. Those annoyingly clever ones move so fast that they can't catch themselves in the process of doing what they do. Still, most of us make a response, and only later do we realize what a better response would have been. Let's work on that, improve our ability to interpret.

Good Interpretation

So, good interpretation, in a phrase, is the power to make full sense of and to understand the purposes that are most alive in a situation, to *place* the pending assertions within that framework of live purposes, and to be empowered to respond in ways that we will approve of later. Secondly, interpretation is the ability to discern in a situation which assertions really *must* be considered and arranged in importance for deliberate action, and which assertions may be passed over, since they have failed, in our judgment.

Thus, interpretation is better or worse, good or bad. It is not right or wrong, nor true or false. And assertion succeeds or fails, and isn't really either good or bad. So-called "bad" assertions sometimes succeed. We would have no politics if they did not. So-called "good" assertions sometimes fail. Assertions also are not to be judged as true or false in any crucial way. An assertion sometimes succeeds even when the propositions one carefully distills from it are false. In fact, sometimes an assertion succeeds *because* it is false, but it plays so heavily to what the audience believes or needs that they cannot be dissuaded by something else that is true (when distilled into propositions). And true and good assertions often fail. So forget about it, ok?

Sometimes audiences interpret badly, or in bad faith (like a disastrous social media pile-on). Similarly, and sadly, some assertions fail because the propositions we



can distill from them are true, but no one to whom the assertion is presented is prepared to make a good faith interpretation of what has been asserted. Imagine trying to have a fair and balanced discussion at a political rally. In short, they can't handle the truth.



<https://url.rylanbooks.com/Xa7pu>

We can see that sincerity in interpretation, good faith, an effort to understand other viewpoints, compassion, and a broad view of the purposes everyone brings to the situation –these are the attributes that lead to good interpretation. Not everyone wants to cultivate these virtues and make them into habits, but a good interpreter is much more empowered in the world than a bad one. If you want to *get* what someone else is really trying to assert, you need to do your best to receive the assertion with sincerity, good faith, effort, compassion, and a synoptic understanding of all the purposes involved, including those purposes most likely to be in conflict with your own.

Practice, Practice, Practice

As we have learned, assertions must go through heavy transformations in order to be expressed as propositions. You did a great amount of interpretation in carrying out those earlier exercises. Do you think you did it well? Do you think you could do it better now, exercising the virtues of good interpretation? One thing you should add to your mental store of ideas is that it is almost always in your personal best interest to interpret well, even when you don't have to act or decide anything immediately. If you interpret well, the world sort of falls into an order that takes on a feeling of objectivity. It is almost as if the world isn't *just* your perspective, but instead, your perspective has expanded and begins to look more like the actual world. If you don't want that viewpoint, you are not as smart as I thought.

So how can you learn to be a good interpreter? Practice the virtues above until they are habits, but you also have to ask a lot of questions, when you are really working on it. These questions are usually requests for clarification from someone who has asserted something. Often people do not express what they are asserting clearly enough for sincere interpreters to decide exactly what their purposes are or what action is called for. Sometimes they even mask their true purposes by asserting something vaguely related to their genuine purposes. Sometime people will even assert the contrary of what they really want (sometimes called "reverse psychology") to see if they can achieve their purposes by using your poor interpreting ability against you.

In some cases, the vagueness is intentional, but not usually. Most people want to be understood as well as possible and thus they want to be easily "interpretable."



But very few people practice *that* skill. You have already been given the tools to ask for clarification of the best sort:

What is the purpose of the assertion?

What is the subject term and what does it denote?

What is the predicate term and how does it supply a field of connotation for the subject term?

What is the best sense of the word "is" that you can offer as a copula for the assertion?

What general feeling do you get from these taken together, and how would you name it?

("Oh heck, he changed fonts again. I'm supposed to notice this?")

You will want to use more ordinary language in asking, of course. Say to the preacher, "that part where you pointed and said 'you,' does that mean just me, or people like me, or have I missed your point, since you don't really know me?" Now you are likely to be taken for insincere in this response, but the question is fair, under the circumstances. The same might be said for the predicate term: "that part about repenting, do you mean that I should go to confess to a priest, or to you, or just silently in my heart, or what exactly did you have in mind, since you want me to do something?" Again, a fair question that assumes good faith on the part of everyone involved.

Damned Aristotle Again

Now, with your clarifying questions answered, you have the makings of a proposition. But before you move to that decision, that *judgment*, you must also consider whether the asserter *knows* the full meaning of what is being asserted.

Look at Aristotle's six questions and answer each of them to determine whether the asserter knows what he or she is saying. Who is acting, what deed, who is affected, what instruments/procedures, what purpose, and what manner? That's a lot of information. Yet, you need it. Seriously.

This preacher has made a mistake. He does not know who he is speaking to, and he has made a lot of assumptions. Everyone in the situation is aware of this, and knows that he is probably over the line, ethically, and is certainly in bad faith as an interpreter of *you*. But that puts you in the driver's seat (unless you are intimidated).

Imagine All the People

It is not a crime to assert something you don't fully understand. It is wise to present such an assertion as a possibility for discussion, and *that* is the action called for in asserting it. "Let's discuss." If the preacher had suggested that we talk about whether you should repent, not knowing the answer, you would have a different (and more constructive) interpretive situation. We must often assert what we don't yet fully understand in order to learn new things. Sometimes we *think* we do know what we mean, but the questions of others help us to see that we hadn't really appreciated the whole meaning of our assertions.

With practice, you can become better at interpreting, but another crucial aspect of that process is to imagine, as actively as possible, what others are hearing, from their own perspectives (including their needs, fears, hopes, plans, moods, backgrounds, and so on), when we assert something. You practiced this when you imagined what you looked like when you were having a thought, the one you wrote down and assessed in chapter one. That imaginative situation holds when you are talking too. There is a "something you look like" and "sound like" to others—and mean. And that is what you *are* to them (is_s). In rhetoric, we call this the problem of the audience. We will discuss it later in the book. For now, your task is one of imagining in order to interpret and to be interpreted better.

The preacher has failed here too, perhaps (unless you really do need to repent and this was exactly what you needed to hear, in which case the preacher got lucky, but sometimes communication is aided by luck, or hindered by bad luck). We engage in this imaginative exercise so as to adjust our expression of the assertion to something easily interpretable by those we address. You must be *able* to be clear before you can have full control of using strategic vagueness to increase your persuasiveness.

You make this kind of imaginative adjustment regularly when speaking to children so that they will understand. The exercise is subtler when it comes to adults, but it is the same process. You imagine what they are in a position to hear, and that is what you assert, to the extent that it aids your purposes. So being good at asserting is an art of making oneself interpretable to others, especially those we wish to act on what we have asserted.

Three Kinds of Judgments

Only now are we ready to discuss the three kinds of judgment that are needed by both logic and persuasion.

The **first** kind, and the most comprehensive, is the **interpretive** judgment. This is



your decision as to what the assertion you have encountered *means*. It integrates the purpose(s) of the assertion with a reduction of ambiguities to just those meanings that come together in the subject, predicate, and copula of the assertion (even if these three parts are not explicit), and which anticipates what sort of action is being elicited from those to whom the assertion is presented. This interpretive judgment will be either good or bad –you can be better or worse at it. You can get better with practice and experience.

The **second** kind of judgment is about whether the **assertion succeeds or fails**. Let's give this a fancyname: Assertoric judgment. Stop snickering. I didn't make that up. You usually make this judgment very quickly –too quickly. You, my dear student, need to cool your jets and see what other sorts of assertions are all around you, and to what extent *they* are succeeding and failing. No assertion comes in total isolation of other assertions. We will get to this in detail in the next chapter.

Now, back to judgment: If the target audience performs the action the assertion sought to elicit, even if that action was as simple as pausing to notice, the judgment is that the assertion succeeded, to some extent. It can be as simple as the old kids' joke where we point off in some direction and our companion looks to see what we are pointing at, and we say "made you look, ha-ha." That pointing finger must be judged a successful assertion, if not very productive.

The same is true of a political speech that motivates you to vote for the candidate who made it. That whole speech can probably be reduced to the declarative sentence "you should vote for me." If some *ignore* the pointing finger or the political speech, that doesn't mean it fails, so long as it succeeds with the target audience, satisfactorily. But if you are not fooled by the kids' joke, and make a show of intentionally not looking, or if the candidate's speech inspires you to vote for the opponent, we can adjudge these to be failed assertions.

The **third** kind, and the most important for logic (and for the formal analysis of language), is the judgment as to whether the proposition you have carefully distilled from the assertion is **true or false**. Let's call this "formal judgment." Sounds like someone being sentenced, by some very severe British judge. But no, it's just a label. Now most logic books will say within the first two pages that "a proposition is a statement that can be evaluated as true or false." This is surely accurate, but it is nearly useless without further clarification.

Many of those books will also say that declarative sentences are the types of statements that become propositions. That also is accurate but cripplingly partial. They do not teach you to find and supply the declarative sentence that is concealed behind images, intuitions, commands, exclamations, and questions, and that means they have deprived you of the most interesting and important part of the communicative process. They even say, sometimes, that these aspects of



communication are irrelevant to logic. They are deeply wrong.

By the time a declarative sentence has been regimented and distilled into a formal proposition, most of the *real work* has been done. Many logicians think that the work of interpretation is not a part of logic. Yet, they will offer you sentences in (very stilted) English and require you to render those sentences in logical symbols. Not only does this activity of rendering in symbols *require interpretation*, it requires a tremendously disciplined *kind* of interpretation. For the sake of persuasion, that skill is not necessary, but for the sake of logic it truly must be learned, and it *is* a part of logic.

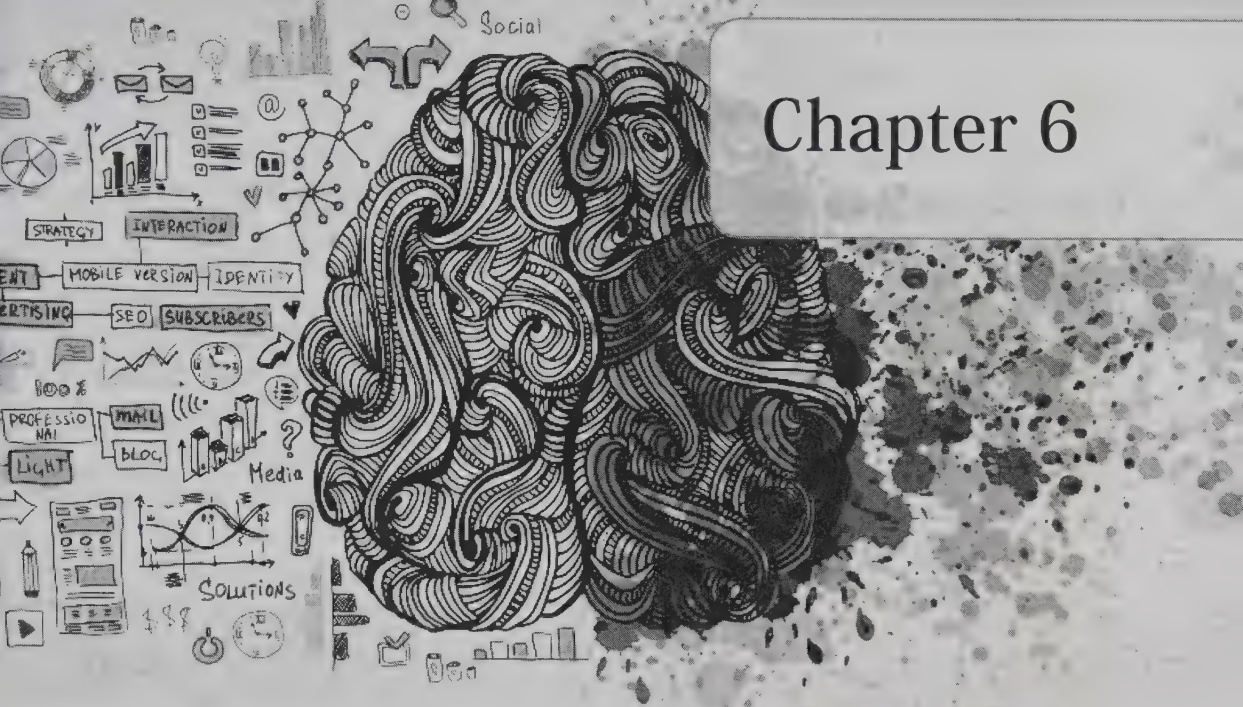
But all students must learn to be better interpreters and to render images, intuitions, questions, and exclamations, and commands as assertions, and to distill and transform assertions into propositions. Only when that has been accomplished are you in a position to make judgments about whether the proposition is true or false. Judging “true or false” is the topic of the next two chapters.

EXERCISES:

1. Check your phone for the last text conversation you had (please skip over anything private and go to something mundane).
2. Render the last three sentences as declarative sentences, regardless of whether they happen to be exclamations (e.g., “OMG!”), questions, or commands, or clipped declarative sentences.
3. State your interpretation, in a few sentences, of the situation, the audience, the purpose, and consider, in what you write, the different perspectives of anyone who might be interested in this sentence –anyone affected by it, anyone who may be included in actions that follow from the sentence, anyone who overhears it or reads it over your shoulder. You are communicating your interpretation to your teacher, and remember that the teacher may not be able to understand why you chose the declarative sentences you chose without your help, your explanation of your interpretation.
4. Consider other possible interpretations of the same sentences, especially if someone with a different perspective looked at it. What would your parents think the meaning was? What about your boss? How would those persons make declarative sentences from this material? Especially, what would they say if they didn’t know it was *your* conversation? This requires some imagination. Write it down.



5. Now, revise these three declarative sentences into (intended) successful assertions. This means that you have considered the actions implied by the purposes for which each of these sentences was given (to you or by you), and you are now presenting them with the aim of judging the degree of success in that context in which they were given. Write the three. Now, write out the answer to
 - a. "What was the aimed for action (even if it was just to get an answer)," and
 - b. "How well did it succeed?" (on a scale from total success to total failure)
6. After you provide the assertions in the form most likely to succeed, distill those assertions into formal propositions, specifying subject term, predicate term, the best sense of "is" and then name the reference. Note: this is a difficult question, but I want you to stop complaining because you're going to do this a lot in this class. It gets easier the more you do it, which is why you will have to do it a lot.



Chapter 6

TRUTH, SUCCESS (AND FAILURE)

Where we left off, you had accepted that whether an assertion succeeds or fails is more important than whether it is true or false. I want to get you more comfortable with that, since other people may tell you different things about truth. They mean well, but they are wrong. For the purposes of persuasion, telling the truth is one tool in your toolkit. Maintaining your credibility with people is one of the most important parts of persuading people, and telling the truth is crucial to being credible.

In logic, they will try to get you to believe that there is more to the idea/concept of truth than simply *telling* the truth. I think they are wrong. Telling the truth, to the best of your ability and understanding, is all there is to truth. There are some famous others who agree with that, but we really do have to consider what these other people say and form a judgment about it.



The Truth Is Whatever Works?

A famous philosopher named William James (1842-1910) once said, basically, the truth is whatever works in practice. It made a lot of people mad. Bad assertions sometimes succeed in fulfilling a purpose, and good assertions sometimes fail. So are the bad assertions that succeed now the “true” ones? People couldn’t swallow that. If you tell a lie and you get what you want, achieve your purpose, and you don’t get caught, you still lied. And if you said something “false” (maybe even unintentionally), but everything worked out, what then? Is that the “truth”? That is what these people said in response to James.

But we all know how the world really works. Sometimes crime pays, lies work, and falsehoods persuade some people, sometimes permanently. Since it does work this way in the real world, our logic needs to capture that feature of the world, and our persuasion needs to be able to work with it. Not just bad assertions that somehow succeed, but lies, deceptions, obfuscations, evasions, and so on, these bits of language so often produce the desired actions that we are tempted to give up on telling the truth.

It doesn’t matter how the world *should be*, because this is how the world *is*, and it won’t be changing soon. And if the world does change, it will probably be in the direction of more lying, not less. We will set aside falsehood of all kinds until the next chapter. I am getting peeved just thinking about it. For now, we need to look at what it means for any proposition to be *true*.

Optimists

Logicians are very optimistic people. They have designed and taught logic for people who *want* to say true things, and whose purpose is to have the things they say be accepted as true by others. I think that describes most people most of the time. Most people want to tell the truth, and almost everybody wants to be judged by others as truthful. So it’s fair to do logic as being mainly for truth-tellers. But in crucial cases, we all fudge, withhold, evade, doctor and decorate our assertions with accompaniments that may fall short of “the truth, the whole truth, and nothing but the truth.” There is a reason they ask you to swear this oath in court testimony.

Everyone realizes how slippery truth can be, especially in cases when everything a person says is true, *to the best of their knowledge*, but perhaps the crucial facts are unknown or left tacit because we wrongly think some piece is unimportant but it turns out that it really is the whole key. The “whole truth” has not been presented, even when we tried our best. Obviously we can deliberately suppress parts of any story also. What to do?



Truth vs. Telling the Truth

Theorists of all kinds make a distinction between *telling* the truth and the truth about “facts” in the world. We can do our level best to tell to truth and still have the facts wrong, or not have all the facts, or be honestly mistaken about the facts. Still, the facts are the same either way (supposedly). But it gets more complicated.

We can *fail to know* the facts and still say what is true by luck or accident, or we can *guess* and say something true. We can even intend to lie but tell the truth against our intentions. This happens in Jean-Paul Sartre’s short story “The Wall,” when a prisoner is being tortured for information about the whereabouts of a wanted resistance leader. To get some respite from the torture, the prisoner gives his captors a location that he is certain is wrong. But then the leader is captured at exactly that place where he wasn’t supposed to be. The prisoner has told the truth when he intended to lie, and in doing so has also betrayed his cause and his comrades. Stranger things have happened. The facts of the world made a deliberate lie into the truth.

Magic Boxes and Bottles

Everyone thinks that saying what is true amounts to some sort of agreement between the words and the world. But we also have to admit that words are deeply different from the rest of the world, comparing apples to oranges (or more like the word “apple” to an apple), and that whatever agreement the two may have is a matter of degree. It isn’t even clear what “total agreement” would look like. Would the words then *become* the world?

The words are, after all, also *part of* the world. But *not* the *whole* world, so something has to be left out to get some other part of the world into the word. But we say “cat,” and it isn’t the actual cat, it’s some weird substitute for the actual cat. That’s what “denotation” means: an exact substitute for something in the world. Substitution can be pretty creative and still do the needed work. Consider this video.



<https://url.rylanbooks.com/dZdcR>

You know, sometimes only the right substitution will do the job. If you’ve got the wrong truck, well, that might come back on you. And there are many people in Texas named “Jack.”

Still, words are not like cats or situations or dreams, or even guys named Jack. In the real world, words are marks and noises and gestures, and they are much easier to toss around and exchange than actual cats and birthdays and brain functions and guys named Jack. And that is precisely because marks and noises and gestures are *not* the things they stand for –they are more portable, ephemeral, transient.

They somehow condense the less portable things of the world into magical little boxes and bottles, which, when re-opened release, if not the things themselves, the quintessence and idea of those things back into the world.

Think about that next time you see a vanity license plate –or when you’re thinking about getting a tattoo. We say the right word and it is almost as if the cat or the birthday or the brain function stands before us. Say the wrong word, and well, it oft goes astray, like the best laid plans of mice and men and vengeful lovers.

Stranger than Fiction

So, we have to confess, truth starts with a kind of make believe: we agree to treat marks and noises and gestures as something other than what they are. We treat them as powerful bearers of meanings that may not be present in our senses. And somehow, some way, we *judge* whether the marks and noises have done this work of “substitution” (boxing and bottling) well enough for our purposes and, when they have done so, we call the marks or noises or gestures “true.”

That judgment “true” can’t be a thing, so it must be a relation *we* see, a kind of agreement *in our judgment* between and among things that are of very different natures. (Even the Miriam-Webster dictionary now includes a definition like this for “truthiness,” Stephen Colbert’s new word for this sort of relation.) It’s actually a kind of experience we have. The judgment is based a peculiar kind of quality, and the quality belongs to the feeling we have about the assertion. Colbert says:

“Truthiness is ‘What I say is right, and [nothing] anyone else says could possibly be true.’ It’s not only that I feel it to be true, but that I feel it to be true. There’s not only an emotional quality, but there’s a selfish quality.” (quoted 2006 at the A V Club)

Things get even stranger when we try to say that we have a “true idea” or a “true command” of a text or a game, or that one road is “true” and straight, while and another not the “true path.” It’s actually a mess, but it’s important, so let’s try to slog through.

Being Rational?

Returning then to just trying to tell the truth, most philosophers want everyone to be “rational” and they think that rational people almost always *want* to say true things, and even when the truth is not known, rational people want to stay as close to the truth as they can, given the information available. I mentioned these philosophers are optimists.

I don’t know very many people who are rational or really want to be. But these



philosophers have modeled the study of formal logic on these hopeful assumptions for over two hundred years. I do not know what world they live in, but mine has a lot of people in it (some of them professional philosophers) who are not the least bit devoted to telling the truth or to being well understood. They will lie to you for advantage or for fun, and they'll confuse you for the same purposes. I don't much like them. They feel the same way about me. We all remember the movie *Groundhog Day*, right?



Middle Age Riot
@middleageriot

Every day is exactly the same:
The White House lies,
accidentally tells the truth about
the lie, then lies about telling the
truth.

It's like *Groundhog Day* with
assholes.

Still, real human beings (all of us) are inconsistent, emotional, self-interested, grasping, often frightened little rodents who will only tell the full truth when they are fairly sure they won't have to sacrifice anything to do it. Even if the cost will be fairly low, we will evade, change the subject, or something similar. On the other hand, most humans also avoid outright lies, since they fear the consequences of being caught.

Telling the truth is something we embrace when the stakes are low. But what about the rest of the time? The rest of the time we fill the world with assertions. These assertions are usually amalgamations of fair and foul elements that are exposed as noble and virtuous, or base and ignoble depending on how matters unfold. Most assertions don't persist very long and their full purposes and motives are never known, even to the asserter. So much for being rational. It's for dreamers.

Damned Lies

But some assertions are deliberate lies, manipulations, prevarications, half-truths, and deceptions. A place must be made for these in our thinking, in our logic, and in our efforts at persuasion. The most serious lie that most people are likely to tell is to claim they didn't know what they needed to know at a crucial moment –they hide behind Aristotle's six conditions of voluntary action and try to defer blame by claiming inadequate knowledge. "I didn't know that was *you* I was talking to." Or "I didn't realize it was a toy gun." And these lies will be asserted with full understanding that they may be closely scrutinized, even distilled into formal propositions.

If this approach to telling the truth doesn't look like a workable plan, in any given situation, people will often claim they (or someone else) made an error or a mistake, even when they knew what they were doing and did it on purpose. These sorts of assertions must be given a standing in our world of persuasion (especially since some people will claim to be persuaded, sometimes even lying about that). Whether logic can handle such lies is another question. In the ancient world, there were logicians called "parrhesiasts" who "spoke truth to power," and who were ready for the consequences. They didn't see this as persuasion, but as required by an honest logic. These people were called "stoics." They mostly died.

Much to the chagrin of logicians, this sort of deliberate lying and calling-out activity also must be given a standing in formal logic. The famous philosopher Umberto Eco (1932-2016) often said that semiotics (the study of "signs," which includes logical signs) was the study of anything that can be used to tell a lie. For our purposes here, what he called "signs" is pretty close to what I mean by "assertions." It probably isn't an assertion if it can't be a lie. That is a long discussion we can have over a beer some time.

If you're at least 21 of course. Otherwise you'll have juice. I'm having a beer. The point is that telling the truth looks like it may be hard to judge, but there is good news: when you have formed a proposition as we have learned, there is a solid way of determining its proximity to (functional) truth –it's warrant. I wish this "warrant" thing was my idea. It belonged to a most admirable person named Stephen Toulmin (1922-2009). I wish I had known him.

Pointless Truisms

So let us start at the high water mark of true propositions: the truest truths. A proposition that is always and everywhere true plays no important part in logic. Logicians call this kind of proposition a "tautology." It is a proposition that is true by virtue of its form alone. "This pen is this pen." That is a tautology. The subject term is exactly repeated in the predicate term, and "is" means "substance" and "identity" (1 and 5 on Aristotle's list.)

When “is” means substance (is₁), all we mean is that “this thing” is “this thing” and without remainder, and not anything besides. It’s boring. When “is” means “identity,” we are saying “this thing” in the subject can be substituted for “this thing” in the predicate without loss or augmentation. Slightly less boring, but not exactly a display of erudition. “Thomas Jefferson is the third U.S. President” might be informative to someone, but not anyone very curious.

Some logicians claim that such acts of substantive identification are the very soul of logic. They are quite mistaken, since these identifications teach nothing much and exhibit no process of reasoning. There is no point in even calling such claptrap propositions “true” since there is no possibility of their being false. If we base our logic on sterile, formal “truths,” and if we imagine that eliminating all falsehood is our aim, we will only create a logic that might be useful for programming computers but has no usefulness to human beings and to their thinking. That is, more or less, what most logic teachers in most universities teach. It is a waste of time to anyone who doesn’t program computers.

You Got Some Kinda Problem with That?

But even then, the boring logicians have all sorts of problems they can’t solve. For example: If Bob divorced Carol, then Carol divorced Bob. Is that true? The boring people say it must be true. But I think, well, yes and no. What if Carol didn’t want the divorce but Bob did it anyway? Then it seems true to say Bob divorced Carol, but untrue to say Carol divorced Bob. And this, friends, is important to human meaning.

On the other hand, from a legal point of view, the two are surely divorced, so from the legal point of view, the first part means the second part has to be true. And that is also very important for the real world. It depends on whether we see “divorced” as a copula that means “as acting” (Aristotle’s 10th sense of “is”) or as “condition” (Aristotle’s 8th sense of “is”). In the 10th sense, the truth of the first part (Bob divorced Carol) doesn’t insure the second part is true. In the 8th sense it does. Whoa. Run that by me again? Yes, friends, “is” is a messy way to be.

The result has been that logicians refuse to consider such cases as Bob and Carol in evaluating the truth of propositions. They ignore differences in “is” and search for rules and conditions that allow them to generalize over such examples. By the time they have been satisfied, the logic may successfully include such cases, but it isn’t helpful for understanding the real world any more.

The truth needs to have a clear and concrete relation to the way it plays out in coordinating and comparing our human purposes. If I say “Bob divorced Carol,” and you say “yes, but she didn’t divorce him,” we may have both told the truth, and even if it sounds paradoxical, most people would be able to interpret it correctly. They would know that Carol didn’t want the divorce, even if she eventually signed



the papers. If your logic can't deal with that, your logic isn't very useful.

I hadn't changed fonts yet in this chapter, so I'm doing it now to make sure you are awake. I am also deliberately lying.

Real Truth is Reference

To say that a proposition is "true" is to make a judgment. The judgment is an *evaluation*, and we are fallible human beings, so we may be wrong. In our terms, the judgment "it is true" means that on the whole, the subject term denotes well enough, the predicate term connotes well enough, and the copula . . . well, it copulates. (Shut up. I mean it. Love you.) Together the working parts of the proposition *refer* to something. That's it. You don't need more. (Except you need to name the beast, that is, the reference.)

Logicians have spent over a century trying to work out what conditions must be satisfied for a proposition to be *true of the world*. Their task is complicated because they see propositions as bits of language and seem to forget that language *comes from* the world, just as images and all other assertions do. The language, as marks and noises and gestures, is part of the world.

Language, whether as mark or noise or gesture, is *in* the world and *of* the world. The question is not how this language stuff hooks *onto* the world. The question is how does it ever come to be *unhooked from* the world –so that we get the habit of treating language as something we can analyze *apart* from the world it came from?

When we trace that process of creating the reference (and you have already learned to do it in this book, and you have been doing it all your life), we see that the reference we create, the beast we named in earlier chapters, *that* is not a product of the rough and tumble world; it is a product of your own effort at thinking. When you have a reference in your thinking, you have a *creature of thought*, a complex product of the functional convergence of two terms (subject and predicate) and three relations (copula, denotation, and connotation). Let's recall how we get such a creature.

Snaring an Assertion

What have you already learned to do? You have made two judgments, one is an interpretation which gathers all the relevant and lively purposes and perspectives together and decides "this assertion means x." You are a trapper in the world of possible meanings. That act of interpretive judgment sets a sort of magic snare around the situation and spreads a net of meaning over everything inside the circle. This snare is never perfect and often not adequate, but it's what you have. You catch within the circle of your interpretation whatever you catch, and whatever is

still roaming wild will have to stay there for now. You could be interpreting badly, but you are doing it anyway.

The other judgment is that the assertion succeeded, at least to the extent that it caught your attention and elicited an act of snaring. Now, if bringing you to an act of interpretation was not the main purpose of the assertion, or even contrary to it (as with the preacher example), perhaps the assertion really failed, but either way, it is caught now, along with some of its context—background, near future, whatever gave it the meaning it has. So there it sits in your snare. Adding an assertion to the world always invites the risk of being snared in an act of interpretation, and very often that is the exact purpose of the assertion.

Whatever is outside the magic circle of interpretation is simply left out, excluded. The act of interpreting removes the interpreted captive(s) from everything else in their world, with many other beasties sitting there uninterpreted. Some of the stuff you didn't snare might be important, but it's out there in the wild all the same.

At the Zoo

So, in interpreting, you lifted the situation *out of* the wild world of actual marks and noises, and cats and brain processes and birthdays, and you cage that meaning *in* your domain of judgment, your zoo. Finding, now, within your domain of judgment, the captive assertion that drew you to interpret, that special critter, what kind of critter is it anyway? I'm sorry for the long analogy, but stay with me, ok?

By giving it a declarative form, you stated the *genus* and its species as a denotative and connotative beast. By putting it into a declarative sentence (which domesticated it and removed it still further from its original habitat), you made it *be* something *for* somebody. There it sits, being an "is" in one of Aristotle's senses of the word. And then you estimated its relative success as an assertion in light of its purpose. Why capture such an animal unless you want to do something with it? Is this beastly a success or a failure, as a critter *of this kind*?

You no longer care about the individual assertion in its natural habitat, but about whether it succeeds or fails as an assertion *of that kind*. That way of looking at the assertion treats it as a sort of specimen that has been captured and is being examined. It is the assertion caged up in the zoo of your judgment. And so, yes, you are the zookeeper.

So you deem that assertion to be really a declarative sentence, then you *train* that declarative sentence and tell it that it must now take on subject-copula-predicate form, and that it must *produce* for you a reference, in captivity. (Yes, yes, the sex is intentional this time.) So the beast you name? That's the beast you *made*, in your interpretation. You could have a monster. You could have a lamb. How good are you at interpretation and judgment?

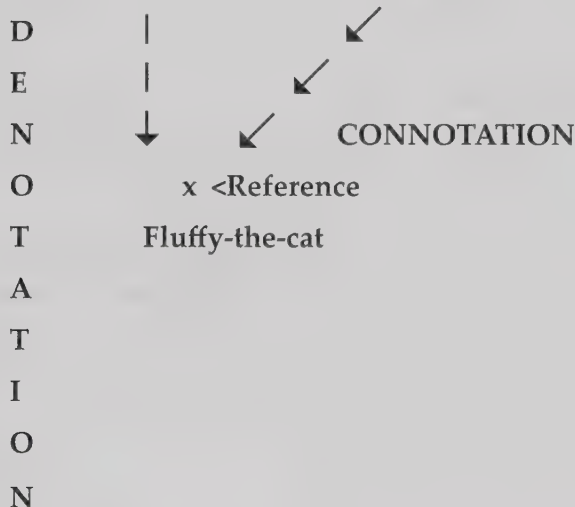


In Captivity

This is the process by which your poor frightened subject term came to be in company with its predicate term and is commanded to produce a reference. Now, you should consider: if the captives do produce a reference, you get to name the beast (remember?). Do you suppose that beast *belongs* in the world where you captured your assertion with an act of interpretation? Or is it only a creature of *your* interpretation, of *your* effort? If you release this reference back into the wild, can it survive? That is a metaphor. It means: what if you got it wrong? You say something and then everyone knows you're not too smart. Maybe you had best keep that beast in its pen.

Take this example. You overhear your friends talking about someone's pet, and you can gather from what they said that it's furry, four-legged, long-tailed, white and brown, female, good-natured, a healthy eater, lies by the fireplace, and is four years old. You think to yourself, they are talking about Fluffy, which is my friend Gary's cat. You can see that you have snared all this stuff, put it into a proposition:

This pet (S) -is- furry, four-legged, etc. (P)



So you say, "y'all are talking about Fluffy." Maybe they say "yeah, sure," and your reference *survived* as an assestion in the wild world. Maybe they say, "no, we were talking about Tim's Great Dane, Sally." Your assertion didn't survive. But either way, the creature of *your* reference was not born as its parents were. It was not conjured, but it was produced *as* a bit of language in captivity, to be handed back to a world not as a raw bit of conversation or imagery born in the rough and tumble of the bar or the boardroom. This reference has a cognitive pedigree before it became a spoken name. It has been consciously produced by someone actively interpreting and deliberately reflecting on language to try to get at some meaning.



What if that reference does *not* behave like the bits of language and image that never gave a moment's concern to whether they "referred" to anything unambiguously?

That's a complicated sentence. Let me put it in a clearer way. You have lots of words and images and phrases running around your brain. They are references, really. But they may not have much to do with the world. They don't care. You made them, they're yours, you are the keeper, you probably ought to let them graze in the meadows of your mind. Don't release them into the world. Not unless you need to.

If you do . . . your reference is a stray in the street until someone else gives it a home, and that, my friends, is what it is like to *tell the truth*. (God help you if you are a stoic speaking truth to power; might be your last release.) Your reference may get hit, lamed, squashed, or it may just starve and languish. But it may also find a home. In that case, all of your active interpretation, your effort in thinking, and your judgment about the reference has been rewarded. Communication has occurred.

But heck, you do all of this so fast that you usually fail to catch yourself in the process of hoping you have said something true, and you succeed so often that you forget the references you produce creatively are strays in the world, and that maybe no one will feed or adopt them.



EXERCISES:

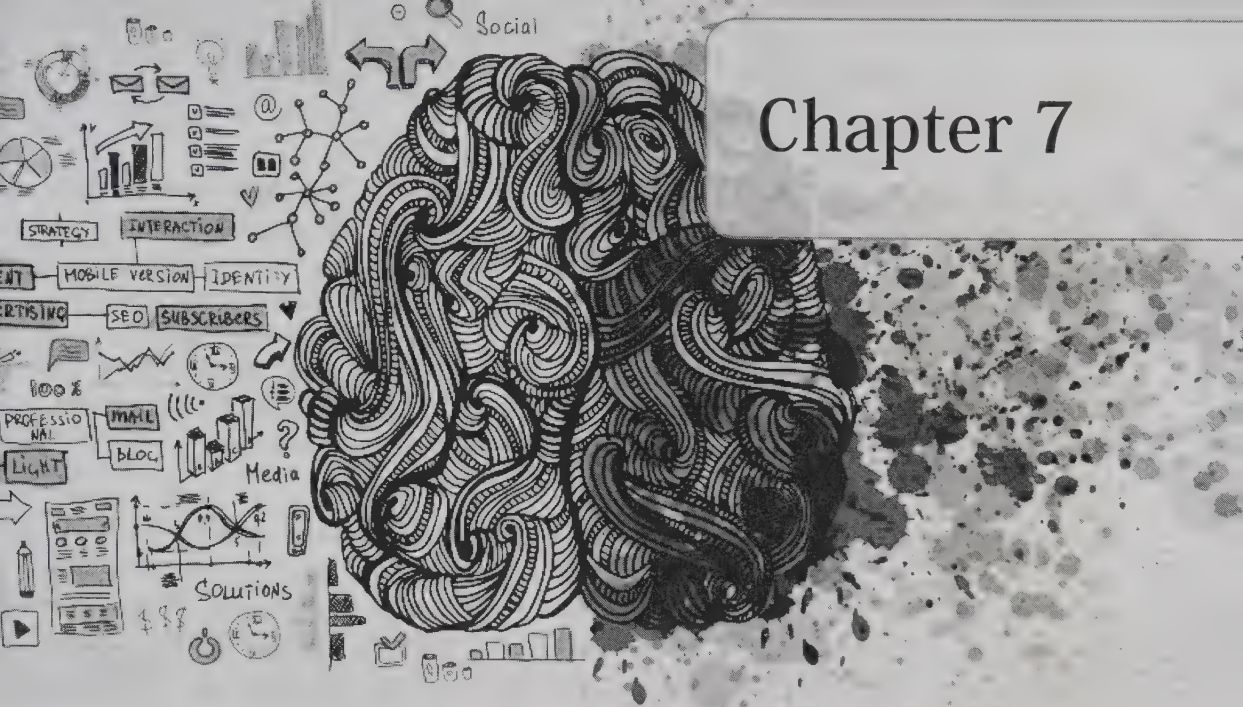
In light of this, please reward all your effort by listening to this nice song. Be sure to stay with this to the second verse and ask yourself what sorts of *references* you see:



<https://url.rylanbooks.com/cQzN0>

There are many assertions in this video, aren't there? You are here in the presence of an obvious piece of human interpretation, thought through and presented back for your attention. It's an unusually "logical" song in that respect, because the songwriter puts so many of his references back into the world so explicitly –the results of very creative acts of interpretive judgment, distilled into denotations, connotations and references, and then packaged in a series of assertions. You can grasp intuitively how he has done it. These exercises require you to share and discuss this song and video with someone, so you may want to choose a classmate as a partner. But anyone who is willing will suffice.

1. Capture (interpret) three assertions from this video/song (images or lyrics will do).
2. Train them into declarative sentences. (Write them out –it should be easy if you choose ones that are already in the form of declarative sentences, but perhaps you should consider some of the less obvious assertions and the references they convey.)
3. Write them as formal propositions showing denotation, connotation and choose which sense of "is" you think best for the copula for each of your three. This should be a diagram like the one I gave earlier in the chapter.
4. Name the references. Consider the denotation, connotation and copula and come up with a word or phrase you think might express that complex of relations –this is hard. It will probably be a long, hyphenated word, such as "giraffe-giving-me-an-incredulaous-look-to-express-disdain-for-humans."
5. Set the reference you have named back into the context and see if it "survives." That is, write that down for me, but you can check it first by telling your partner the name. Is what you say "true" of the song; I mean, are you telling the truth? You may do this by asking a friend or a roommate whether your reference for just those assertions helps in understanding the song. Write whether it does, and how well it fares; if it dies, describe how that happened –rejected, ignored, misunderstood, etc.



Chapter 7

FALSEHOOD, FALSITY, FALSENESS, ERRORS, MISTAKES, AND LIES

The Zoo of Interpretation

The exercises from the last chapter brought you face-to-face with some odd creatures. An ordinary trip to the zoo turned into some kind of imaginative reference explosion, where suddenly it was asserted that the animals take on very human attitudes toward their situations. Some of the animals are political, some philosophical, some with dispositions and tendencies we normally reserve for moral judgments. What happened? Language is a slippery critter, ain't it?

The fellow who wrote this song is enormously famous, as a poet and songwriter, having won just about every award and honor, not to mention fame and fortune, that an artist can possibly achieve. Your parents and grandparents are probably admirers and they may have some recordings lying around. His name is Paul Simon. You should check him out.



The dude is really a poet, but poets in his generation wandered around with guitars and put their poetry to music. There was more money in it. Besides, that was the only way people would listen. Poetry is boring. In your generation, people who want to present poetry get a drum program and a computer and a big pair of speakers. It's the only way people will listen. Poetry is still boring. Y'all like to use lots more words than your parents did, and nasty ones too. You kids should take a hint from Jack Ingram in the song from that last chapter. You can always say "I love this mother-lovin' truck that keeps breakin' lovin' down." See? Nice and clean.

You have probably tried your own hand at poetry. (You should delete it before someone actually reads it.) But if you're like me, part of the trouble you have is knowing whether it's any good, and suspecting it isn't. But maybe it is, you know? You tried to rap spontaneously too, but it's, like, hard. You're probably not doing it right.

Part of the problem is that it's hard to understand how we even *make* poetry, especially the element of metaphor. The trip to the zoo in the video? That videographer is putting images to the lyrics of the song (Paul Simon didn't make this video; it is someone else's interpretation of the song.) But what the song *did* was take "a trip to the zoo" as an extended metaphor of human life and has presented it as a sort of commentary on humans, by means of animal images.

Paul Simon says that "zebras are reactionaries" when what he probably means is that "people who think in black and white are reactionaries." He says "elephants are kindly, but they're dumb" when maybe he means is "Republicans mean well but are not very smart." He says "antelopes are missionaries" when maybe he means "some people bound away from their local problems to solve other people's problems in a distant place." And he sums up his extended metaphor by repeating his hunch that "it's all happening at the zoo." He has taken a look at the human condition, has cast his net of interpretation, and has distilled the (metaphorical) assertion "human life is a zoo" into a pile of assertions that reinforce that proposition with examples. It isn't exactly an argument meant to persuade you, but it does have *some* persuasive power, and *some* logical structure.

But They Lie!

There are a number of assertions we might want to disagree with in the song. The poet surely knows, for instance, that actual elephants are *not* dumb. The Republicans he has in mind probably aren't really dumb either. (Paul Simon had a mixed relationship with the Republican Party over the years.) Many of those "elephants" aren't kindly either. But there he goes, asserting it anyway, even though he knows it's some kind of lie.

The great ancient philosopher Plato decided to ban poets from his ideal city



because, as he said, they are all liars. They will present you an alluring picture of the world, in words, that is *not* the actual world. You may even prefer the poets' stories and images to what you see with your own eyes. Those wicked poets will persuade you to act on things you don't really understand, because you believe the story rather than what your own better judgment tells you. Newscasters and reporters and politicians and preachers all use metaphors for the same purpose, but the poets are so good that you might forget it's just a story. Take Kanye West as a case in point –I sometimes wonder whether *he* remembers it's just a story.

I never liked that part of Plato because he thinks most people are not capable of thinking for themselves. I think most people really can judge for themselves, even without a course in logic or persuasion, but I admit that too many people get carried away with things they haven't thought through. This class will help prevent that from happening to you.

Errors, Mistakes, Deceptions?

If we now add the video images into this discussion of the song, there is some deceptive looking stuff there, too. For example, when the song says "the monkeys stand for honesty," there is an image of a chimpanzee. A chimpanzee is not a monkey, it is an ape. Is this a mistake, an error? Or is it the result of a deliberate interpretation? In that case, we are given a *reference*, one that resembles us more closely than a monkey would. Is that a trick? It is hard to say, without asking the makers of the video.

Also, the makers decided (perhaps in poor taste) to focus on the act of animal reproduction at the end. There is surely some kind of commentary being asserted there, especially where the giraffe (the insincere people) attempts to mount a zebra (the reactionary people). What sort of offspring would that produce? How odd. They definitely chose that on purpose.

That image of the giraffe with the zebra leads me to take the purveyors of this video seriously as people who probably didn't make an error with the chimpanzee. They took this song very seriously, listened to it many, many times, selected their images very carefully. They almost certainly know that a chimpanzee is not a monkey. And that *very last* image, the giraffe on the zebra? That is the assertion they wanted to *leave* in our minds. These video-makers are not just tossing out random images. They have studied the lyrics and have made a whole series of interpretive judgments and I think they are *asserting* something quite consciously with each image, especially the last one.

I am not sure what they want me to think or do, so maybe this assertion is failing. On the other hand, I chose their video to put in this book and I'm sitting here writing about it. So maybe it succeeded. I am certainly exercising my mind over it. Yours too, I hope.

And because I can see *some* of what they probably mean, in my own interpretation, I don't want to see the chimpanzee image as an error, or a careless moment, or a falsehood, or a deception, or a lie. I want to find a *reference*, if I can. I should be careful before I assert that this is an error, or perhaps some more nefarious act, such as a deliberate lie. I name my chimpanzee reference thus: chimpanzee-as-monkey-standing-honestly.

Poetic License

Now, paying close attention to the lyrics, the first line is "Someone told me it's all happening at the zoo." And the second line says he *believes it's true*. But, somehow, we can feel that the poet has a *different* zoo in mind than the first speaker, "someone," had intended. He adopts an "ironic distance" from what he has been told, and his statement that "it's true" actually *modifies* the original statement "someone" told him in a way that the original speaker might not accept.

If Paul Simon were to answer this "someone," he might say "yeah, the *human* zoo." The original speaker might well reject that as the reference, saying "no, man, I mean the actual zoological garden in the Bronx." And if he says that, Paul Simon might reply "the zoological garden in the Bronx has more people than animals on most days." It's a compromise. Maybe that will satisfy everyone. The poet's reference has been released and has found confirmation in the world of real conversation. It *is* functionally true. I do believe it. Even though that's not what anybody in this conversation actually *meant*.

So, you take a gander at this conversation:

Someone: "It's all happening at the zoo."

Paul: "I do believe it. I do believe it's true."

Someone: "Then why are you snickering?"

Paul: "It's all happening at the human zoo, man."

Someone: "I'm talking about the actual zoo; it's cool"

Paul: "Most days there's more humans there than animals. That's why it's happening."

Someone: "Yeah I guess so."

Not much of a communication. But a little. The second time the song comes to this part, the lyric is "*Something* tells me it's all happening at the zoo," and then you can almost hear Paul laugh as he sings that he believes it's true. That is different. He isn't talking to that "someone" anymore. He is thinking and talking to himself.

He has had an *insight* and has made a *generalization* from the first verse. The human zoo isn't just at the park. It's everywhere, and it's enlivened by certain kinds of ideas and habits and character traits. We *all* live in the zoo. You can feel that he means this and not what he meant before.



The poet is re-interpreting *himself*. He has reflected on his earlier interpretation when he was talking with “someone.” And he has re-worked it into a much broader assertion, but he expresses it in almost the same words, “it’s all happening,” but not quite the same. He switches from *someone* to *something* to alert us to the difference. And *after that* is when all the new and strange (and literally wrong) assertions come tumbling out. Hmmm.

Wrong?

Antelopes are not missionaries. Giraffes are not insincere. Zebras are not reactionaries. And so on. All of this is literally wrong, but it is not error, or deception, or even lying. And most importantly, it conveys a **kind of truth** (metaphorical) that our logic and our persuasion must include. The same goes for the images that were chosen by the makers of this video.

The comments by the public below the video on YouTube are quite telling. Some people want to correct the “errors,” while others seem well aware that these were not necessarily errors. You, as students, must remember that the real process of thinking includes all of this discussion, but you can have the discussion *in your thinking* without having to *assert* it. Just because you have worked through the most literal interpretations of an assertion does not mean that you have given a *good* interpretation. It takes work. Thinking is work.

By the way, it literally bugs me how people say “literally” all the time when they mean “metaphorically.” Get it? “Bugs me.” But no six-legged critters?

One thing that the makers of that video couldn’t possibly have imagined is what comes now. All that copulating at the end of the video? That could be interpreted as asserting that all the real action in logic and persuasion lies in how one renders the copula, the sense of “is.”

Denotation is never wholly literal because it’s a relationship between a word (subject term) and something the word is *supposed* to denote, something which is *not* that word (it does not have to be a physical thing –it may be another word, or an idea, or a process, or a situation, and so on). The name “Thomas Jefferson” is not the actual man, it’s a couple of words. Same for Frank Zappa or Kanye West. And “zebras” are not actual zebras. And the same goes for “Captain Kirk,” and “ $E=mc^2$ ” and “yo mama” and . . . well you get the picture.

Connotation provides a field of meaning, a situation in which the denoting is to be carried out, but connoting is always at least a little bit vague, so no matter how confident you are that you understand what is being talked about from context and inferences, it still may not be Fluffy the cat; it might Sally the Great Dane, or some other reference that fits the field of connotation. But the language used to *create* the connotative field is *not* the field itself.

So, if denotation and connotation are never wholly literal, and if the copula can mean at least ten different things (they only put eight images of copulation in that video, so they weren't reading Aristotle, I think), then **should we say that all language is false?**

In a sense, yes. We have to start *predicating* with a clear awareness that our speech acts are different from whatever they are *about* and also different from whatever they may be *taken to mean*. You can't even capture your own exact thinking in language, let alone capture the world.

In recent times, the study of logic, in most universities (not yours, apparently, since you have this book), has simply evaded this undeniable fact: meaning is not dependent on reference, except insofar as reference is *thought* by an interpreter who has made a complex judgment. These old-fashioned people (not your teacher) say these concerns about thinking and language are "extra-logical" or "non-logical" or irrelevant. That attitude is functionally false and it blocks progress in our understanding of thinking and logic. To avoid the consequences of their narrow and disastrous view, the logicians try to make things as literal as they can and then ignore the rest. That metaphorically bugs me. That isn't good enough, if they want to tell the truth. They are, in a word, "wrong." The good news is that teachers of persuasion never bought such assertions.

Can We Get Anything Right?

We have to rework what "false" means so as to include all the *productively* false stuff, the stuff that even though it lies or errs or distorts or deceives, still succeeds or works or builds or palliates or ameliorates. (I put in those last two words just to get you to look them up.) Our new "false" has to mean "sometimes true" and "true in some sense" and "part of the story" and a host of other things that allow space for reworking whatever has been asserted in constructive ways (and perhaps also devious or subversive ways, but that is for another day). We are not doing ourselves (or our thinking and our action) any favors by pronouncing sentences "false" when they might serve desirable purposes –when they might be "true" in some serviceable way, for communication, for reasoning, for reflecting, and so on. Sometimes we get things right by getting them wrong.

Reaching Back, Moving Forward

Returning to our discussion of formal propositions, if anything goes astray in the process of producing a reference (a general feeling of the combined denotation, connotation and the meaning of "is"), we will see some shade of falsity enter in, but often not enough to kill all usefulness. For example, if the connotative field is too broad for the denotation, we have a slip. Consider:

This cat is a thing.

This cat is an animal.

This cat is a feline.

This cat is on the mat.

What information do you need in order to judge that a *response* to these assertions has a shot at being productively, informatively “true”? You need the *purpose* that the proposition serves. Consider the following questions:

What sort of animal is a cat?

Where is the cat?

Is that an illusion of a cat?

Is a cat a plant?

You can easily match these questions with the four propositions above, as questions to which those propositions are answers. (It’s like *Jeopardy!*) And by now you should be able to change these questions into declarative sentences. When you do that, you will see there is still some slippage as to “truth.” Clarifications are still needed. Mess around with these eight propositions and explore the possible combinations in pairs. I will wait while you do that.

Here is the pair I messed with. Consider the pair:

“The cat is some place” (the declarative version of “where is the cat?”) AND
“This cat is on the mat”

There, I made the second sentence a response to the first. If you reverse the order, the second is a generalization of the first.

Similar examples can be given when the denotated class is too broad or narrow for the connotative field, or when the copula is too broad or not clear enough to join the denotation and connotation “tightly” (you will see this term again later in the book). No matter how much we work at our proposition, there will be some slippage or looseness –some margin for error, some room for misunderstanding, some path for deception—as long as the subject term and predicate term are non-identical (not a tautology).

Even apparent tautologies can be loose. For example, “Grover Cleveland was the 22nd President” seems airtight, tautologous. But it’s partial. He was also the 24th President. 22 *is not* 24. Normally these numbers will be non-identical. But not in this case. Logicians call these non-identities that show up in the predicate term(a) “synthetic propositions.” The predicate term *adds* something to the subject term. All interesting propositions are synthetic, and all synthetic propositions are loose in some way. The references you create from them can vary tremendously, and you can err.



Fluffy and Spike

Continuing with our earlier example, what if we need to be sure that “*the cat*” and “*this cat*” are the same? Vagueness has slipped in. The person answering “*this cat is on the mat*” to “*where is the cat?*” may not be certain *which* cat the questioner intends, and so is giving a very specific answer to a somewhat vague question, perhaps to be considerate or just very careful. I asked where is “*the cat?*” You said “*this cat is on the mat,*” implying that if *this cat is the cat* I was asking about, it is here (the mat); otherwise, no answer yet.

But we see that when the proposition “*This cat is on the mat*” produces a reference in us, that reference is not enough to make the proposition functionally true. The released assertion, your response, still has vagueness in it, because we don’t know whether “*this cat*” is “*the cat.*” To be sure, we must produce the reference that answers to the *purpose* of the inquiry. And we must assert it successfully.

If you were seeking the whereabouts of Spike and you have been given the whereabouts of Fluffy, the proposition is *false* in the most important sense: functionally false. Even if the assertion succeeded in getting my attention, it failed to meet my purpose. The reference does not survive as an assertion. Our inquiry is not advanced at all by the answer, except in the trivial sense that you now know Spike is probably *not* on the mat, which only eliminates one possibility. It makes no difference at all that this pittance of information answers our shared purpose in a more abstract sense (we both now know where *a* cat is, but not *the* cat I was asking about), because we cannot act to fulfill our purpose regarding the whereabouts of Fluffy when what was sought was the whereabouts of Spike.

If it seems that “*false*” is too harsh a word for judging an answer given so carefully and in good faith, and with the best intentions, I suggest you get over your inhibitions about using the word. We really are coming to the point where we can say something is “*false.*” Functionally speaking, your answer is just as false as if you had deliberately lied to enrich yourself and impoverish the world. When I was a kid, my older relatives would say “*a miss is as good as a mile.*” That was a way of saying “*close but no cigar,*” which for some strange reason survived as a metaphor. It means the same thing as “*not getting what you aimed for is like getting nothing at all.*” Aristotle said that. It’s a metaphor. Purpose is a powerful thing.

But I would say it even more strongly: “*being fed functionally false information is worse than getting nothing at all, since one has to untangle the falsehood before one can even resume one’s task.*” As you can see, I’m not as eloquent as Aristotle. He didn’t have to talk about Fluffy and Spike. It is so much easier to be impressive early in a civilization. Now most of the good stuff has already been said. You and me are down to cats and mats.

Clearing the confusion may be as simple as saying “*I was looking for Spike, not Fluffy,*” but it still has to be done. You will do someone a greater service by



saying you don't know the answer than to give them an answer that they have to investigate to discover was wrong. If you have doubt, ask for clarification. If you didn't even suspect there was a second cat, it's still on you to help your companion be clear enough to get a reliable response.

So?

You may be saying to yourself, "this isn't important." You are wrong. If a traveler asks you for directions and you are not very confident you understand what the traveler is really looking for, or that you know exactly where it is, you will do everyone a favor by saying "you should ask someone else." If you give information that is functionally false, you not only didn't help, you obliged the traveler to discover your mistake through an effort and expense of time that could have been avoided. You might as well have lied deliberately, because the consequences are the same.

Another example would be when someone asks a politician "what will you do for the economy?" and the answer is "the economy will be great, terrific, best ever." In a way, that answers the question, but it is functionally false because what was sought was some far more specific plan. Only with such information can a voter make an informed decision, and that, after all, was the purpose of the question.

When someone else has a purpose, the thing you absolutely must be clear about before asserting anything, is that you really understand the purpose and you are in a position to present an assertion in return. Politicians are not respectful about discovering the differences in our purposes. They are bullies in conversation, answering the question they made up, not the one you asked. Conversations are dynamic, like herding a whole zoo of propositions into a "meaning corral" and trying to get them all to settle in. But some of those propositions get loose or get lost or get trampled. The zoo can come to chaos.

Spike Meets Fluffy

Now, "*this* cat is on the mat" is a careful response, and even if it is functionally false, it is surely *abstractly* (and literally) true. It embeds a hypothetical question: "*if* you are seeking this fluffy looking cat, it is on the mat." This is a solid proposition, called a "conditional proposition." The only way it can really be true, functionally, is when the first part of it, the "antecedent" is affirmed. We can then check to see whether the predicate connotation includes the denotation. Otherwise we don't know whether it is functionally true.

A better answer would have been "which cat are you seeking?" Upon learning it was Spike being sought, not Fluffy, perhaps you might have said "The cat is on



the sofa,” or better, “Spike *is* on the sofa.” Or perhaps you could say, “not on the mat.” And that would have been “true,” if not very helpful (assuming Spike *is* on the sofa at that moment, or at least not on the mat). Or you could say “I don’t know” which would have relieved you of the burden of saying something that is functionally either true or false.

What makes that second, more informed answer functionally “true”? Well, logicians have historically focused on whether and how we call *tell* whether Spike really *is* on the sofa. They call this “verification,” and it is part of a general category they call “sound” collections propositions. To be honest, I don’t think it matters very much about *verifying* states of affairs with our observations. The question is one of *agreement* with the purposes of inquiry and whether action can be taken, which includes verifying what *needs* to be verified, and *to the extent* it needs verifying.

Yes, it is “false” that “Spike is on the sofa” when Spike isn’t, and “true” that he is when he is, but more importantly, what did you want to *do*, or want done by someone? Oh, you wanted to *feed* Spike? Then let me say something functionally true: Open a can of cat food, loudly, and it won’t matter much where Spike happens to be right now; if he’s in cat earshot or nose-shot, *he’ll find you*. And so will Fluffy. Now *that* is functional truth, answering to purpose.

Judging True and False

There is very little point in worrying about whether propositions are true when the *purposes* for which they are examined can be fulfilled with less effort –including less thinking, which costs effort. But the formal analysis of language exists to help us with harder cases. We must be able to grasp clearly what a proposition *includes* (the denotation and connotation as determined by the sense of the copula) and what it *excludes* (everything else). We must have this information in order to *judge* whether the proposition is true, or something less than true (false, or, if we have asserted it, functionally false, which is the falsest any bit of language can be). That judgment is the heart of our thinking. It is where active thinking and reflective thinking converge. The reference appears: our general feeling of what the meaning of someone’s assertion is. Naming it is another act. The reference *is* the judging act. “This.” Or “ah-ha!” Or “I got it.” Or “Eureka!” It is a consummation of predication.

References are complex. They have **three aspects** corresponding to the three contributors to their appearance. They have a sense of the subject, of the predicate, and of the copula. We could spend a whole book studying what kind of entity this “reference” is, and we will say more about it a few chapters from now, but for now, you can hold it before your mind as an achievement and a product of thinking. You should be proud of it and give each reference the best name you can come up with.



Substitution

Another way of asking the question of truth or falsity is whether the proposition as offered answers the purposes of inquiry. If it does, there is agreement between the purpose and the proposition, and that agreement is like having a key that fits the particular lock you want to open. There may be more than one key, and the keys that fit may not look the same, but *all* the keys that fit answer the conditions imposed by the purposes we brought to the table, that is, the lock. Those keys are functionally true. A reference that doesn't open the intended lock is a worse problem than having no key at all. You have had this thought before, when you were trying several different keys to open a door: The one that works is always the last one you try, not because it's the only key to that lock, maybe even on your keyring, but because it opened the lock, and that was your purpose. Functional truth is like that, and that is the assertion (the key) that you want.

But where do all these shades of falsity come from? They come from the distance you create between the world of action and your processes of thinking. Your interpretive judgment, no matter how good it is, separates off some portion of the available world of meaning and encloses it for your thinking process. It is really *your* denotation, *your* connotation, *your* copula, and thus, *your* reference, but it may survive if you assert it. Communication is a delicate and highly contingent process.

As I said earlier, you can get better at this, but you will never be above making poor (misleading, erroneous, deceptive, even functionally false) assertions. When you have gathered your assertions for your real process of thinking (including reflecting), you create a sort of mirror image of the world of action in your mind, and you move around the pieces of your thinking world *as if* they were pieces of the world of action. You decide what to assert. You do this very quickly. Too quickly.

Now, all this thinking is a *substitute* for action; you pause to think because you want to rehearse in your thinking what you might do without yet doing it, adjusting it to the needs and purposes in the fluid world of thinking before expending effort in the less fluid world of action. But the thinking is also an action. It takes time and effort, but it costs very little effort to think about something compared to the effort (and consequences) of acting on the same thought: that is, releasing a reference of your own creation as an assertion into the world, that others will see and interpret for themselves (that may or may not survive).

The simplest actions, such as just *saying* something, are still public, and irrevocable, and thus beyond your full control. So you need to slow down, to be careful what you say and how, because it is an assertion, whether you like it or not. And you cannot unsay it, even if you can further say "I take that back." You still said it, and your credibility to convince or persuade others is affected by taking things back that you said earlier. (Sometimes it can enhance your persuasive power, but



usually not.) It rarely hurts to think before you speak or write. In logic, it is wholly expected.

When you say something, you also reveal some aspects of your thinking process. Only a person who *would have been thinking* about *this sort of thing* would say what you said. If you did not think carefully, others may conclude that you were thinking in ways you were not, or they may conclude that you are not very good at thinking through what you say. And they may also detect the parts of your thinking you would rather conceal. If someone says “the cat is on the mat” and you say “until a better mat is available,” you reveal a lot about how you see cats, the quality of that particular mat, and, by extension, the world.

Letting the Cat Out of the Bag

And this brings is back to that song “At the Zoo.” You may or may not have noticed that almost every example in this book up to now has involved animals. That is not an accident or a coincidence. It is a decision about how best to get students to catch themselves in the act of thinking. Now you can catch me if you haven’t already. I really like cats. They pervade my thinking, daily, hourly. They are ever present. Dogs, not so much, but all sorts of animals are swirling in my mind, as I wonder about how humans think. There will be a lot of horses later in this book. I don’t actually know much about horses, but they are serviceable as thoughts. For me cats become little portable counters or markers in my thinking that can be moved around in all kinds of ways. The result is probably that many references I release as assertions into the world have a vaguely feline sense.

In that Paul Simon song you get a lot of information about the *thinking* of Paul Simon. The song comes off as being cynical about human beings, substituting various sorts of beasts and seeing their behaviors and characteristics through that broad metaphor of the zoo. The types of zoo animals become *substitutes* for the types of people. There is truth in it for sure, but the thinking process, while very creative, isn’t all that flattering to the one who does it. Paul is tipping his hand: he doesn’t respect humans very much. That first verse, where he describes how to get to the zoo? Well, that *is* a trip through the *real* zoo, namely, New York City.

We may or may not agree with the basic point of the commentary, seeing the “truth” it conveys in metaphors and substitutions, but what’s the purpose? Enjoyment? Are we supposed get a good laugh at our own expense? Is the poet including himself among the zoo animals or holding himself above most of us? Is this criticism? Are we supposed to become better people?

I don’t like being seen as a monkey when I stand for honesty. I don’t trust someone who spends that much effort trying to decide what sorts of animals my friends and loved ones are like. I will not use this kind of metaphor to persuade people to do something. Or as a premise in a logical argument. Imagine it:



All reactionaries are like zebras
My Uncle Jack is a reactionary
Therefore, my Uncle Jack is like a zebra

Na. Too much slippage between "is" and "is like," you know? I don't know what answer to make to the poet except, "that's very clever, what you did there, Paul. Are you having a bad day?" But he is a poet, and a very good one, and this is his job. He is making a fine living and doing it well. His purpose is to write a song people will listen to and most importantly, buy. I listened. And I bought the record too. Successful assertion. I like this song, I confess. Even if I am unpersuaded and the logical reasoning is lame.

But I also like it for a reason that the poet never considered. It taught me something about my own thinking. ***My thinking, all of it, which begins with an interpretive judgment, is a great big metaphor that stands in place of the world, as a substitute for the world that acts on me and on which I act.*** I think in order to not act, yet. All of my thinking is literally (not functionally) "false," in the sense of a metaphor, a substitute, and thus my thinking is partial, prone to error, liable to deceive me. But most importantly, my thinking is "false" in the sense that ***my thinking is not the world; rather, it is and is supposed to be a substitute in miniature for that world,*** a process in which I can rehearse actions without carrying them out, move the pieces around for a better complex of denotation, connotation, and copula, and in which I can name the beasts that are my references and decide whether to release them.

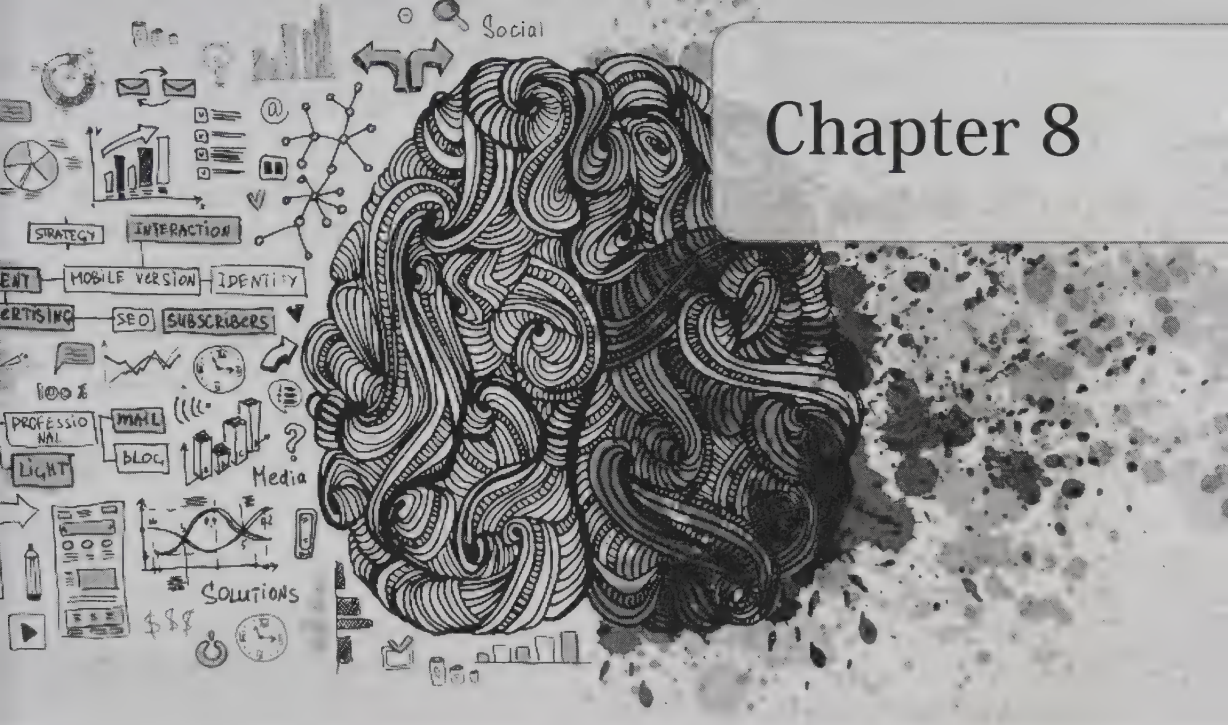


EXERCISES:

This will be difficult. You have to make things up and you will feel unsure of your results. Get over it.

1. Write down something you think is false in some way: it can be a lie, a deception, an error, a half-truth. (In other words, you can write down a sentence of any kind. They are all false in some sense. It is easier if you write a declarative sentence.) Do not think it through now. Just write it.
2. Think of a purpose for which someone *might assert* this sentence, and write the purpose.
3. Now, think about a situation in which someone might *act* on the asserted sentence and *successfully* fulfill the purpose in #2. Describe that situation in a short paragraph.
4. Now, keeping the same sentence, imagine a purpose in light of which asserting that same sentence is functionally false (actually impedes the purpose). Write down that purpose.
5. Describe a situation in which #4 might occur, in a short paragraph. (So this is like #3, except the purpose is impeded.)
6. (This is the hardest one, because you have acted already, without thinking it through in advance.) Think through your sentence twice, providing two versions of the formal proposition with denotation, connotation and sense of "is"; the first time, *name* the reference that, when released, succeeded (was functionally true); the second time, *name* the reference that failed (was functionally false). This means that you write out your formal proposition twice, but with different references (beast names), one functionally true, one functionally false. (Hint: the names will surely be different.)
7. Reflect on the relationship between the first and the second names. Report your reflections in a short paragraph.

You will want to see an example. Reread the chapter in light of these exercises. You will see that the chapter provides several examples of each. The conversation with the preacher in the last chapter also may help.



Chapter 8

SERIAL PREDICATION

The Train of Thought

We have learned how to regiment our language a little further, into propositions, and that will help us hold our general categories (Aristotle's "is") constant while we introduce some movement into our propositions. We even had the beginnings of an "argument" in the last chapter. As we have seen, the real process of thinking is a movement *from* the world *into* our thinking and then *back* to the world, as we interpret and then give back assertions. We process the assertions we hear and see according to our powers of interpretation and judgment, and our best guess about the purposes they serve (we call this guessing "abduction" later in the book). We ourselves then try to serve or impede those purposes. That's what we did when we formed a proposition, found the reference, named it, and released the result as an assertion, setting it loose in the presence of our companions.



Up to now our thinking has been very simple. Interpret the world, think about what to do, and then act on it by asserting something. But our *thinking* is capable of long chains of associations, many of which never come to the point of a final (or settled) reference (a beast that we can name). Sometimes we follow a path of potential consequences in our thinking and see that we do not *wish* to act along a certain line. So we stop thinking about it. Other times we do come to our conclusion, but we don't act or assert; we "store it," so to speak, perhaps for later action.

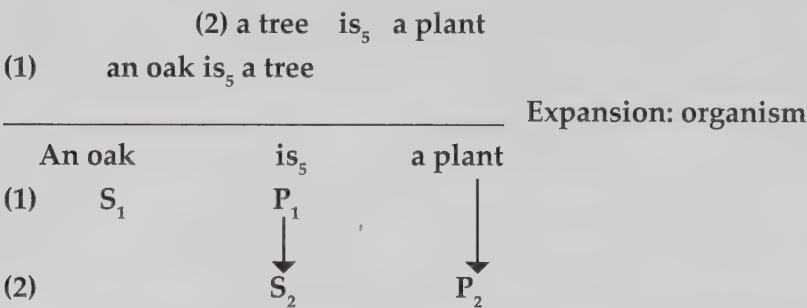
We usually call this our "train of thought." Sometimes we lose it, but how do we *forg*e these chains of associations? How can we do that better?

In making these associations, we often make leaps and bounds in our thinking without taking time to fill in the intermediate steps. In logic, that is not allowed. In persuasion it is not wise. As tedious as it may be, we need a model of our thinking that helps us feel and become conscious of our movements in thinking from one proposition to another, to see where we have been and keep track of it. You wouldn't get very far in the world with only one proposition. You need a bunch of connected ones, don't you?

The philosopher and psychologist Delton Thomas Howard (born 1883, but no one seems to know when he died) developed a way of noting the movement of our thinking in what he called "serial predication." It's a boring name and he was a boring man, but you aren't so interesting yourself, yet, either. Let' see if we can make you more interesting. This method that Delton (what were his parents thinking? "Delton"? Seriously? bet he got teased) developed replicates our thinking process, at least when it is at its most orderly. Delton's method is useful for our purposes.

A Simple Series

Here is an example of how we might think if we actually thought in propositions, starting with number (1), then (2), then below the line:



Name of the beast (suggested) = levels-of-organism

Test it and see how it *feels* to think that progression. There is a feeling of being *carried along* from one term to the next. (That, by the way, is what the word “metaphor” literally means, in Greek, to be carried along and then beyond, so it’s a sort of metaphor.) That *feeling* will be important in both persuasion and logic. You need metaphors to do logic. We just learned that in the last chapter.

What is this diagram?

We have lined up two propositions so that the predicate term of the first proposition (number 1) is the same as the subject term of the second proposition (number 2). We have maintained a constant meaning of “is” (the fifth sense) and our *expansion* “organism” is set off to the side for convenience. The term “expansion” will become important. We’ll talk about it more in the next chapter.

Notice that every occurrence of a subject term and predicate term can, for our purposes, be interpreted as a “thing,” but I chose a more specific term, “organism” in my expansion. I will explain why shortly. The first proposition, as expanded, would read, in full “an *organism* that is₅ an oak is₅ an *organism* that is₅ a tree.” What I mean by “expansion is that we provide a more general term that includes all the other terms, and then we put it in the proposition.

We have written the formal (“regimented” or “standardized”) language in ascending stairsteps above; the first proposition (1), and we have traced the progress of our thinking to the next proposition (2), and then, in symbols (S_1, S_2, P_1, P_2) we showed it descending below the line. The symbols express the *form* of the progression that happens above the line.

When we added a second proposition to our first one, an important transformation occurred. The second proposition as expanded would read “an *organism* that is₅ a tree is₅ an *organism* that is₅ a plant.” Our expansions enable us to treat every term as a *subject* term (with a denotation). The expansion, “organism” is shared by all three terms in the series. With that general term, “organism,” we chose to expand both subjects and predicates.

The Magical Transformation: Intensive Inclusion

The question that may occur to you is: “How does a field of connotation (the predicate function) *become* a denotation (the subject function)?” They are, after all quite different in function. Denotation only picks out a thing. Connotation is just context for that.

If that question occurred to you, we are really getting somewhere. If it didn’t, well, don’t sweat it, but you’d better go back and read the question again to see if you understand what happened. Denotation and connotation are very different,



in function, and in creating meaning (a reference). How can an “expansion” turn *all* of it into denotation?

The answer is that you have to expand both terms and substantivize the field of connotation to bring them into a larger context that they can share denotatively. That is what you do when you generalize. You do it all the time, but you don’t notice yourself doing it. I like to tease people. Someone might say to me “please close the door,” to which I respond “you are suggesting that I should do something?” My friend becomes exasperated and says, “yes that you should close the door.” To which I say, “but that *is* doing something.” I have lost many friends. Any friend of mine must be very patient. (I have worse habits than this one.)

Generalization enables us to treat two or more terms on the same level of generality. So you *were* talking about oaks, but now the path of thinking has become more general, not just oaks but trees in general. The oaks are still *included*. I observe that both “oaks” and “trees” are organisms, so our new topic is safely generalized as “organisms.” I insert the expansion “organisms” into the proposition, and now I have a broader field of thinking in which both “oak” and “tree” can denote, but not in the same way. “Tree” is more general than “oak,” but “organism” *includes* both. Very tidy.

You will notice that I started with and kept the same meaning of “is.” That makes things easier, but it isn’t absolutely required. That’s because some senses of “is” can include other senses of “is,” either completely or partially. Many people think that the first sense of “is” (substance) includes *all* the others. Such a view is called the doctrine of the “univocity of being.” I don’t agree, and I think those people are twits, except for two or three of them, but we don’t have to go into that. I just wanted to type the words “univocity of being.” So I will type them again. The doctrine of the univocity of being. There. That felt good.

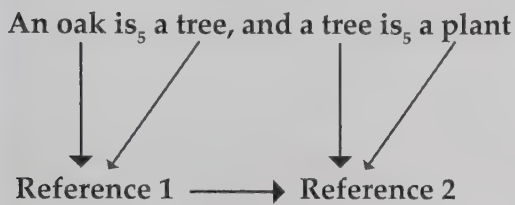
The way to continue your path of thinking (without slippage and vagueness) is to use the same substantive expansion through the whole path, and the same sense of “is.” You can always use “thing” as an expansion, but your thinking will lack “parsimony” if you do that. Parsimony is good if you want to get anything done. It means you should keep everything as simple as you can, except when it will cause you to miss something important. How does that apply here?

When a lower level of generalization will do the work of coordinating your terms, you should expand at the lowest level you can manage. “Organism” is one level of generality more abstract than “plant,” and that keeps things as close to the meaning as possible. When you do that, your thinking is “tighter.” That is why I chose “organism” instead of “thing.” Parsimony is valuable in both logic and persuasion because it means that you haven’t included anything you didn’t need in your thinking. Your expression of your thinking in an assertion can do the same—which is always desirable in logic (not always in persuasion). Sometimes the “cake” of persuasion needs some decorations, but logic never does. Logic is all

angelfood. But parsimony in *thinking* (as distinct from in *assertion*) is an advanced virtue of both logic and persuasion.

The discipline of thinking no more than one *needs* to think is crucial to learn. Consider this: Computers are very good at staying on a single task. But they are stupid when it comes to judging what they *need* to be thinking about (that's up to you, not them), and they also make up for a lack of parsimony by being able to carry out repeated operations superfast. You, on the other hand, need to have reliable shortcuts. "Inference" is what we call your shortcut. Get good at it and you're better than a computer because you're not stupid at judging.

The transformation of a field of connotation to a solid denotation calls for a new field of connotation so that a second reference can be added. Let us collapse the example above further:



The genuine movement of "inference" is from reference to reference. It happens more in your gut than in your head. When you are making rapid associations in your thinking, often you are hopping from reference to reference without being conscious of it. But the best progression of thinking is a careful *inclusion* of the earlier reference *in* the later reference.

There are many ways that one reference can include another. The example here is the inclusion in a broader class (tree) of a narrower class (oak). Easy. But what if the "is" were time (6) instead of identity (5)? In that case, the terms can be the inclusion of an earlier event in a later event. Or if it were the "is" of position (7), the later reference might be included in or might include the position of the earlier reference. For example, the runner is on base, and the base is third base: that's is₇. Or alternatively, the runner is on base, and the base is on the field, it's probably is₄ place. If the "is" means condition (8), we might say the man is a running a fever and the fever is a symptom. In each of these examples, the first term is *included* in the second in some way. It is called "intensive inclusion," and we will talk more about it later in the book.

These examples could all be expanded using "thing." "The thing that is a man is a thing that is running a fever and the thing that is a fever is a thing that is a symptom." In each of these examples, the first term is included in the second in some way. But can we be more parsimonious? Surely we can. "Thing" includes far more stuff than we need to be thinking about here. Consider it. What expansion term will capture the relationship between these two references?



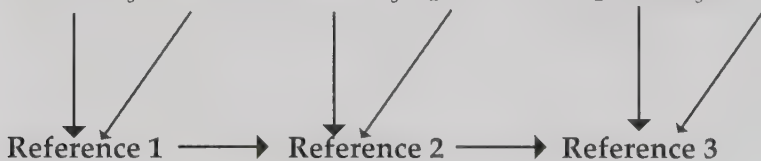
If you diagram the two propositions separately, marking denotation and connotation for each (and obviously it's the eighth meaning of "is" in both, condition), and name the references, and then consider what the references have that binds them in a larger class, well, you'll surely see something. How about: "The unhealthy man is running an unhealthy fever, and the unhealthy fever is an unhealthy symptom." The expansion is an adjective, grammatically, but it defines a *class* of things to which all the terms belong. That's our goal.

But trying to produce this "best" general term of "inclusion" directly from your imagination or intuition or a hunch? Without doing the slow work? That's pretty hard. You're only guessing when you do that. I'm trying to make it easier. Do the work. You'll see. This skill is more valuable than you realize. If you can do this it will put you in charge of every discussion, because you will have the exact word that binds everyone's constructive thinking together.

Aye-aye Sir!

Inclusion is the movement of references, as I described, so long as our propositions are *affirmative*. The moment we enter anything negative, the whole series of propositions has been *enclosed*. So far, we have only looked at one example with three terms and three propositions. We could add a third.

An oak is₅ a tree, and a tree is₅ a plant, and a plant is₅ an organism.



Now we will need a new expansion, since our third term needs to be denotative as well as connotative. Name Reference 3 above and see whether you can find an expansion that is tighter than "thing" and "intensively includes" all of the terms. Go ahead, I'll wait.

Sir No Sir!

Now imagine that I follow up the series above by saying "and an organism is *not* dead." Obviously, you can see that this means an oak is not dead, and a tree is not dead, and an organism is not dead, but the use of a "not" *encloses* the whole thought, and then puts the class of "dead things" in contrast to the whole series. It brings the active chain to an end. When you come to the "not," you are now "reflecting" on the whole series. That is what the word "not" does. It puts a stop to your active thinking and makes you take stock of the whole of what you have thought. It turns the *thinking* into the *thought*. Remember, "thought" is the past

tense of “to think,” as well as being the noun for the sum of whatever your thinking produced: it produced a thought. And it’s the thinking that counts, in spite of what you’ve heard. The thought is merely a product of the thinking.

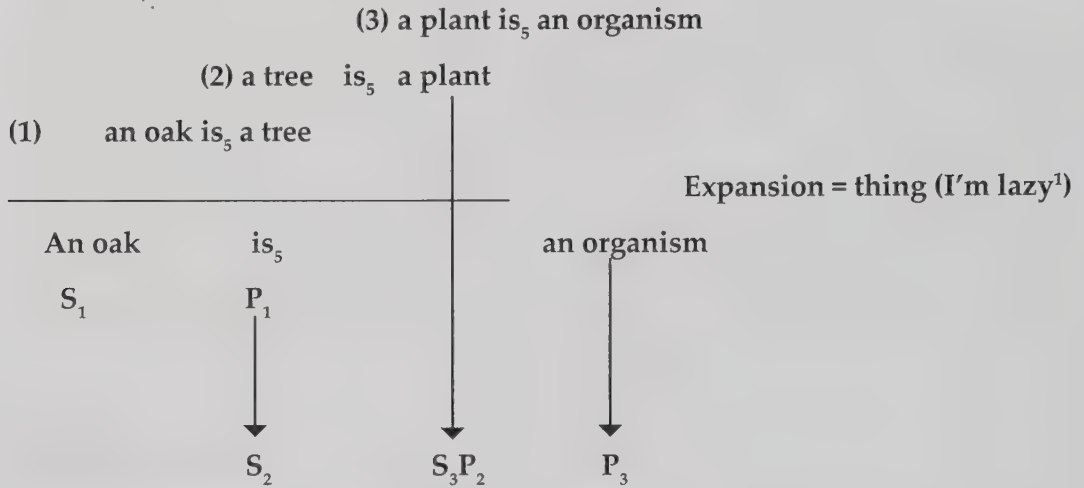
This makes the word “not” very powerful. Any two-year old can show you this power. It has the effect of enclosing the past and foreclosing the future. One is left standing there, reflecting, in the present, and not doing anything else. This is what you feel like when someone turns you down for a date, which is why I never asked anyone for a date. Except once. She said no. I learned a lot about enclosure of the past and foreclosure of the future from that. Her name was Debbie. I thought maybe she liked me. And here I am teaching you persuasion and I couldn’t get a date. Well, really I never tried before or after. My wife asked me out. I said yes. Still, when Debbie said no, I sat there thinking about it, but my thinking was not active. It was reflection on something that was over. It is similar even with an oak, a tree, and organism is not dead. Thought finished.

Same with every “not,” my friends, but some of them hurt more than others. I barely felt anything when I typed that “an organism is not dead.” But I admit that I thought for a minute: “hmmmm, we still *call* a tree “a tree” even when it’s dead, but we almost always say ‘dead tree,’ and when the wood of *an* oak has been made into furniture or firewood, we still say it ‘is’ oak, when what we really mean is that it ‘was’ an oak, but now it’s like, furniture. It’s even worse when we think “zombie” and the so-called “living dead.” Humans are strange, the way they talk so vaguely about things, but somehow everybody knows what we mean anyway. Usually. Not always. Which is why you need this book.

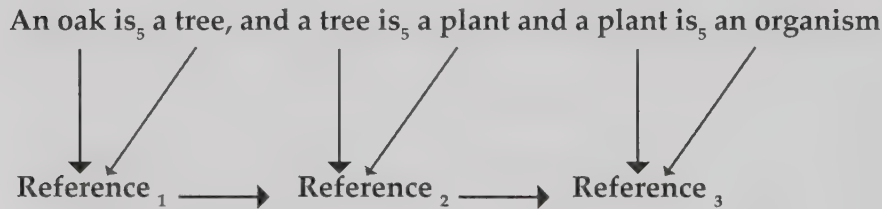
We will learn later that this act of enclosure (of “not,” of restriction and contrast) is the same act by which we create *concepts*, but for the present it is enough to recognize that these serial predications *do* come to an end. (Thank goodness.) As “series of inclusions,” these logical relations are called “intensive” relations. That is not important to remember unless you decide to proceed further in your study of logic than this book takes you. For now, it is enough to see that we could have named all those references the same “thing” because the term “thing” includes, well, *everything*.

A Rudimentary Argument

Let us take the example further.



We can collapse this series as follows:



If you are feeling like this is a game of “There’s a Hole in the Bottom of the Sea,” you are not much mistaken.



<https://url.ryanbooks.com/5buqr>

The old children’s song uses serial predication to have fun. But notice that the movement of inclusion is not that of class, it’s position (is₇), if it’s about the stuff in the hole, or perhaps place (is₄), if it’s about where to find all of it. It depends on your purpose. If you’re giving directions, it’s is₄. If you’re conveying information about relative position, it’s is₇.

¹Surely you see that I mean “a thing that is an oak is a thing that is a tree, and a thing that is a tree is a thing that is an organism . . .” yada yada yada, but there might be a more

parsimonious expansion term.

When I was a kid we would extend the song by saying there was a germ on the flea, and then a cold *from* the germ, and then a cough *with* the cold, and then a doctor *for* the cough, and then a shot *from* the doctor, and you could add whatever you wanted to make the song longer, but when we moved from a germ to a cold, we changed the sense of “is” we were using, from place or position to condition (is_8), and after that, with every new preposition, we got a new sense of “is.” It isn’t a bad idea to notice how important prepositions are in helping us feel the changes in the meaning of “is.”

You can feel it’s different, when we made the first change –there is a cold *from* the germ. The predicative series was pretty “tight” until then, but it got looser as we tried to extend our series. We might have continued the tighter series by saying molecule, then atom, then electron, then quark, but even that still feels like some kind of shift to me, when we start moving into things we can’t see (without fancy instruments). On the other hand, I’ve never really looked at the bottom of the sea and I don’t expect to do so. So maybe it’s really all just “stuff-I-heard-in-a-song,” and that reference-beast shows me pretty clearly the class it all belongs in: song stuff.

Limits and Uses

Most people can only follow a serial predication for two or three transformations before they begin to get lost. In the song, the reason they repeat the whole sequence every time is to keep it fresh in short-term memory. If you extend the series much further than the flea, it becomes an exercise in memory.

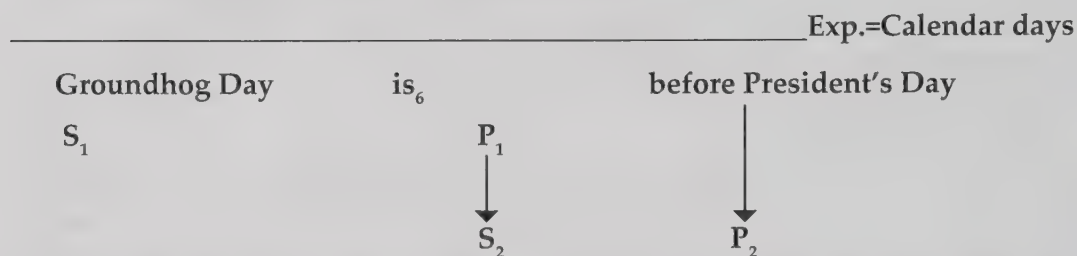
For logical purposes, you might extend these chains of reasoning as far as you like (you’d best write them down), but for persuasion it is good to get your case into two overall movements of thinking, three if the audience is really attentive. So, if you want people to understand and really think, just two predicates and it’s the one in the middle, the one that moves from connotation to denotation, that does all the work in your argument. That limit of two predicates goes for teaching a class, preaching a sermon, or writing a research paper, too. That is part of the reason that a good sermon is supposed to be three points and a joke. More than that tires the patience of the congregation and goes no further distance toward persuading them –unless the speaker is truly exceptional. Since you probably are not that kind of speaker, *yet*, then staying within the limits of ordinary people’s attention span is recommended. You’ll do some logical exercises that go a bit beyond that, but long chains of reasoning are for technical specialists in any given field.



Since this serial predication idea is new to you, let's do one more.

(2) Valentine's Day is₆ before President's Day

(1) Groundhog Day is₆ before Valentine's Day



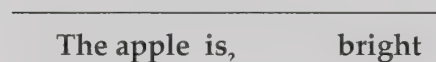
You see that, in this case, time is the sense of "is." Of course, we don't know the purpose of these propositions, so it feels a bit unfinished. So, for practice, why don't you make up a purpose for this series. Who might say this and why? Now, carry the series a step further. Add a predicate to the series. Now, add yet one more predicate, but include the word "not." Study the effect on your thinking.

Serial Predication Gone Awry

If you change the meaning of "is" in the midst of a series, things can get weird and gooey, as we saw with the children's song, only worse. Consider:

(2) Red is₃ bright

(1) The apple is₅ red

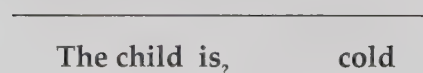


What, maybe quality (is₃)?

Or, even worse:

(2) Here is₃ cold

(1) The child is₄ here



Notice that it is also difficult to find an expansion term lower in generality than “thing.” Even then it doesn’t make sense. **What “tight” serial predication, and lowest level expansion, enables you to do is get a very clear view of the path that your thinking, or someone else’s, will travel when operating at its most parsimonious.**

The Syllogism

I mentioned this above, but now I want to pause over it: In a serial predication of three terms or moves, notice how the original predicate term, the one which becomes the second subject term, facilitates the movement of our thinking, but then sort of disappears:

(2) Philadelphia is₄ south of Boston

(1) Miami is₄ south of Philadelphia

Exp = latitude

∴ Miami is₄ south of Boston

When a serial predication has only three terms, and is formed like this, it is called a *syllogism*. The syllogism is the most basic form of logical *argument*. Some logicians believe that every good argument that can be formulated and expressed as a syllogism. Whether this is or isn’t the case, every argument we need to make in this book can be expressed as a syllogism. **An argument is defined as a logical structure in which premises are offered as evidence for drawing a conclusion.** There are types of arguments that are not syllogisms. We will learn other kinds of arguments later in the book.

In the example above, premise (1) is a proposition that converges on a reference, denoting that Miami is a place, and that this proposition is assisted in referring to that place by the connotative field “south of Philadelphia.” In order to be sure that this subject-predicate combination is “functionally true,” we must know the purpose of the inquiry. It is true that “south of” can be interpreted as “position” (is₇), but that depends of the purpose of the inquiry. Assuming that our purpose is to discover the relative latitudinal positions of these two cities, or something similar, our proposition is functionally true. The same may be said for premise (2). Note that the purpose needs to be the same for both premises. If we change the purpose, we are not reasoning; these would just be different thoughts. They would not belong in the same argument. The purpose envelops the whole argument.



Taken together, the question of whether these premises allow us to draw the *conclusion* is a matter of their evidential *sufficiency*.² The conclusion is the proposition following the triangle symbol \therefore (which means “therefore”), joining S1 to P2. We have names for these roles in a syllogism.

(2) middle term is major term

(1) minor term is middle term

minor term	is	major term
\therefore S	S2/P1	P2

This schema is the master *argument form* for everything that a persuasion student needs to know about the formal analysis of language, but it’s just the beginning for a logic student. It looks deceptively simple. It is not simple. Trust me. There are several reasons the schema is complex, but at present the main point is that **the middle term drops out of the conclusion, disappears, and yet, the middle term is where the important transformation has occurred.**

The Heart of the Magic: Stuffing

Your work, in thinking, occurred when you took the connotative field of the first predicate term (the predicate of the minor premise) and transformed it into something with the power of a denotation, something substantive. You did that by *expanding*, which is finding a more general class to which both terms belong. That is why it is so important to learn expansions: they join *thoughts* together. The name for this transformation is: you took a reference that was a thought (there was a negation involved) and made it into a concept by *stuffing* the previous subject term (S1) *into* the predicate term (P1), and then treating the outcome (S2) as sufficiently warranted by that very act of *stuffing*. You made all this happen. You may be wrong, but you did it.

That’s complicated. Let me unpack it, if I can. If you named the beast well and made the inference well (about the relation between the two references), you stuffed something into a bag just *made for it*. A nice tight fit. If you named the beast badly or inferred badly, there will be some stuff hanging out and maybe some busted seams in your mental bag. It isn’t very pretty.

Have you ever noticed that there are things that never fit back into the bag they came in, like tents you take camping? Are there, like, elves somewhere that fold these damn tents magically and put them in these tiny-ass bags?

²Logicians usually use the word “sufficient” in a narrow and technical sense meaning “when one has this premise, one needs no other premise to draw the conclusion one is considering.” That is not what I mean by “sufficient.” I mean a range of evidence reaching from barely enough to warrant the conclusion all the way up to more than enough to warrant the conclusion and then some. So, in this book, sufficiency is about the delivering of warrant, in light of a purpose, not about cold, incontestable certainty.

I have called this stuffing “intensive inclusion” above, but that is more a name for the outcome than for the process. You’re the elf. Logic is your magic. As your thinking moves, you can feel yourself sort of sucking up that first subject into the predicate, packing it for a trip, and then shoving off. When you are done stuffing the subject into the predicate, the first subject is “intensively included” in the predicate, which we now *call* a subject, so that we can add a second predicate. You *could* unpack it if you had to, but for now, it’s all snug up in there.

This stuffing or embedding or conserving doesn’t have a good name in English. The Germans call it “*aufheben*.” It could be translated as “to stuff just what is sufficient and nothing else.” Tight, excellent, elven stuffing. But even to them (both elves and Germans) it’s a bit mysterious. So, in a way, the middle term “disappeared,” but in a way, it’s still all there, preserved in the conclusion.

The Art of the Middle Term

In the next three chapters we will be examining this transformation of the middle term very closely. The art of persuasion just *is* the art of the middle term. It is also the heart of logical reasoning. When you have understood better what happens when you “stuff” a subject into a predicate and then push forward with both (going under the *name* of the second subject, the one you made by stuffing), then you will understand how to carry the thinking of others along. You get them to do the exact sort of “stuffing” that you have made *your* purpose. We all stuff it. It does not mean that they will do what you want them to do, i.e., to act on your assertions, but it greatly increases the likelihood.

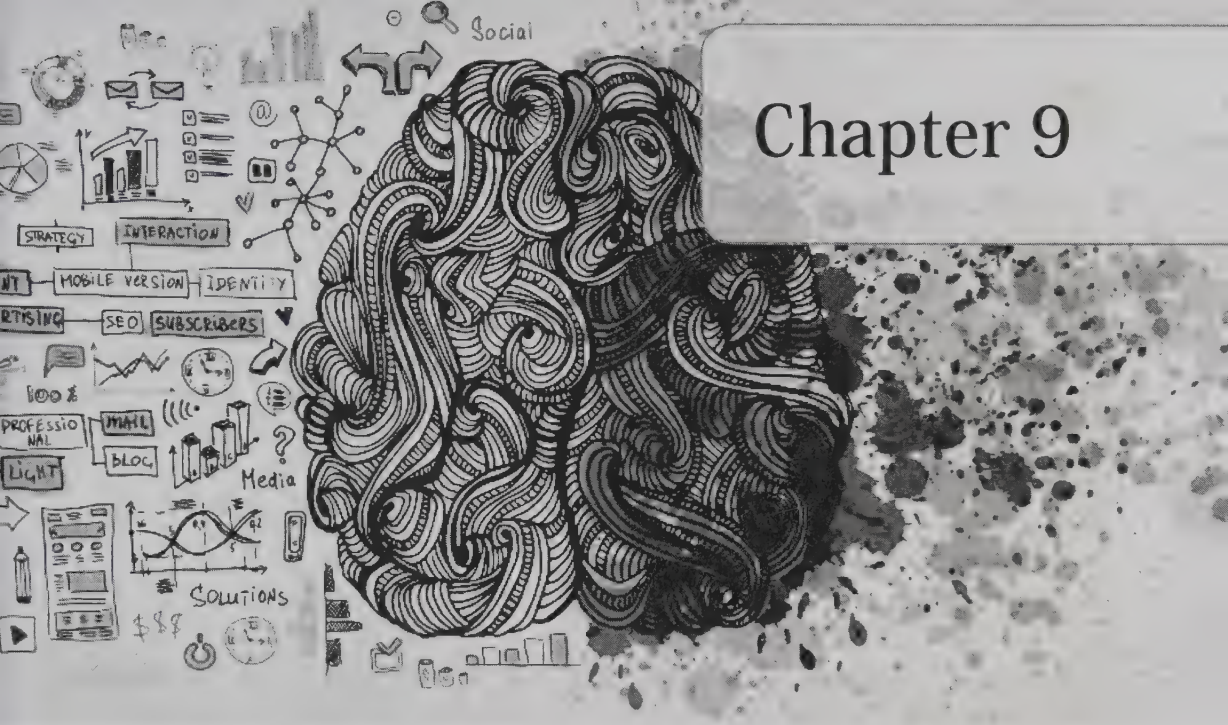
For logic students who are getting all up in their own heads, please be aware that you are not relieved of the responsibility of persuading people just because it isn’t your primary goal at present. There is little reason to have a command of the formalisms of logic unless ultimately you can use them to get your point accepted by the ideal, rational, sincere interlocutors that logicians dream up as conversation partners. (As Quine pointed out, incompatible translation manuals can co-exist even in the world of rational inquirers. In short, we never fully understand one another, and we don’t have to, but it helps.) So even logicians must accept that impeccable logic doesn’t *settle* the argument. Arguments, even philosophical ones, exist in a world in which persuasion still holds sway.



EXERCISES:

You have been dreading this, and for good reason. This is difficult at first, but when you have done it a few times, it gets easier. What makes it difficult is that you have to generate all of the movement *yourself*, not merely follow someone else's process and repeat it mechanically. This self-powered movement of meaning is called "thinking." Bertrand Russell once said "people would rather die than think; in fact, they do." Please prove Bertie wrong. He so often was.

1. Beginning with the proposition, "Jim is tall," construct a serial predication by adding one more proposition. Set it out in writing like the examples in this chapter.
2. Choose an appropriate expansion at the lowest level of generality you can find and write it to the right of your serial predication.
3. Write out both of your propositions with the expansion included (this is the long form demonstrated on p. 84).
4. Using the predicate "tall" as your middle term, construct a syllogism. Write it out. Does your earlier expansion still apply? If not, generalize until you find one that does. If you have done everything correctly, your premises should be sufficient for warranting the conclusion.
5. Take the next assertion you hear with your physical ears (nothing private please), write it as a declarative sentence. Choose a purpose and a sense of "is" and make a proposition with a denotation, connotation, sense of "is" and a reference. Name the beast. Write it as premise one of an argument (as on p. 6). Now, append a second proposition using the predicate of the first proposition to form a serial predication. Now form a third proposition (below the line) using the subject of the first proposition and the predicate of the second proposition. If you have done everything right, the third proposition (below the line) should follow sufficiently from the other two, and in order to understand the process, you have to stuff the first subject into the first predicate. So, stuff it.



Chapter 9

STANDARD FORM: CHARITY AND SUBSTANTIVE EXPANSION

Torturing a Proposition

In this chapter we will begin the process of reducing vagueness in our language by regimenting it one step further. You have learned how to make an assertion into a proposition, by means of regimenting a declarative sentence and finding a denotation for the subject term, a connotative field for the predicate term, and some sense of “is” for the copula.

In order to work with propositions as basic units of meaning, we have to go a bit deeper into their structure. You may think you already have it all, but that isn’t so. There is much more going on inside a proposition than we have covered. For example, there are adjectives that tell us how to find the denotation and hook it to the right sense of “is.” There are adverbs contributing to the connotative field that *become* adjectives (or even disappear sometimes) when we transform a connotation to a denotation, as we carry out a serial



predication. There are prepositions doing all sorts of mysterious work in helping us interpret.

The good news is that we don't actually have to pursue all of that in this course, but you should be aware that it matters. For now, we will learn to do explicitly what we do implicitly all the time: generalize. Perhaps you will remember how difficult it is to generalize. We will get lots of practice doing that as we continue to put our propositions in "standard form." That is what we call it. It might be closer to say we are "torturing" the proposition, making it say explicitly all the secrets it hides. We put it on the rack and stretch it until it tells us everything it knows.

Furry Animals

You will remember Fluffy and Spike. If I say "the cat is on the mat," I might mean either of these beasts, or some third cat. That is because "cat" is a general term that takes in all sorts of individual beings, including Fluffy and Spike. In fact, the word "cat" conveniently covers *all* cats, even wild ones. The context is what tells you whether the speaker means all cats, wild and tame, or just house cats, or just a few of the house cats, or even just one: "my cat."

It recalls the old joke: A man walks up to a woman who has a dog on a leash. He asks "does your dog bite?" The woman answers "no." So the man reaches to pet the dog and it bites him. "I thought you said your dog doesn't bite!" "He doesn't" she answered. "This isn't my dog."

Alright, this isn't going to be especially fun because language is slippery and vague. But maybe you like slippery, vague things. The territory we now enter requires you to get rid of as much of that slippage and vagueness as possible. You need to do this in order to be as clear as possible about what is *included* in your subject and predicate terms, and what is *excluded* from them. Both terms in a proposition can be understood as *pointing* to a reference, say "furry-animals-in-our-proximity" as a name for the beast (the reference). Some terms denote, others connote, and that's how we get our reference. **Our first task is to work out how general the denotation is.** In the case of "The cat is on the mat" we saw that there is a wide range of individuals that might be denoted. It's an infinite list, in fact.

One thing we didn't consider is whether the speaker might have meant this: "the species 'cat', itself, is on the mat." That might include the whole species, and in two different senses. It might mean that every individual cat, and hence the whole species, is on the mat. That would be strange but not out of the question—you can't pack every member of a species on one mat, unless 'mat' is intended to connote the whole world (which it could, poetically: "this green mat of ours"). I don't usually think of the earth's surface as a mat, but I suppose I could. It's an interesting metaphor and we have already established that these relations will be metaphorical no matter what we do. And in this case, we have to admit: THE cat,

as such (species), *is* on THE mat (earth).

So this case seems to mean the cat, *as such*, is on the mat, *as such*. It's very general. But I suppose we could send a cat and a mat into orbit and that case wouldn't be covered by this interpretation: different cat, different mat, elsewhere. **But we can expand our language to cover all cases, possible and actual by using the word "all."** "All cats are on the mat." This is called universal quantification. We will get to it later.

Second, our proposition could mean "the cat" in the sense of "the *exemplary* cat, the very essence of cat-ness, the culmination of every cat, a cat so very cat-like that one need never see another, is to be found and observed on the mat before you, here and now." (I think that every cat may actually hold this very view of himself or herself.) This is not just Fluffy or Spike, it is THE CAT. And THE CAT, in its regal essence, is currently on the mat. So there sits not just an example of a cat, but *the* exemplary cat. And that's a different sense of "cat as such." As you see, we can vary the meaning by imagining other ways and criteria for including some cats and excluding others, all while still just saying "the cat." You would hope that the words "the cat" were clearer than that, but they ain't. That simple two words can mean lots of things, just as with all language.

A Moveable Feast of Meaning

The great value of language is its flexibility along lines of generality and specificity, as we have seen, but also its *portability*. We can take it with us anywhere. It is inconvenient to toss an actual cat at you every time I want you to think about one, so I toss out the word instead. But the word collects more meaning than the actual cat I spared. That means you get the wrong idea. Even the simplest utterance, such as "look there!" can have infinitely many meanings, depending on who says it and when and where. Language, like thought, is a substitute for the *things* we are talking *about*. Speaking is both a kind of action itself, and a substitute for action.

But there is a second substitution. Just as our thinking is a metaphor for the world, our language is a substitute for our thinking. You can think about and imagine things you can't quite say, and you can say things you can't quite think about or imagine: think about a square circle. Now imagine one. Go ahead and let me know how that works out for you. If I didn't have the words "square circle," could I think about a square circle? I doubt it. But I wrote it, didn't I? So what am I writing about? Is it anything at all, when I can't really think it?

So there is a difference between thinking, and language, and action in the world. But language usually mediates between our thinking and our action. Not all the time. But most of the time. When you need to hit a fastball or swerve your car to miss a stray dog, you don't work it out in language ahead of time. But that weird and wonderful relationship between thinking, language, and action? That's where



all the work gets done. You can generalize your thinking by choosing a broader term in language. You can generalize your language by thinking in a more general way and then expressing that broader view in language. Either one can come first: choosing words or thinking. But the result is the same. It's generalizing.

Your job in this chapter is to get better at generalizing, slowly and explicitly, and to make as clear as possible the exact levels of generality you want for your purposes. This is not a scientific process, with perfectly repeatable results. When people make assertions, much of the meaning is drawn from context, and thus, a huge amount of information is understood by all involved at the moment of utterance. Some information is vague. When that concrete moment that supplies the context has passed, the assertion becomes harder to judge, interpretively.

Yet we do it all the time. You can read some books written a hundred years ago with a high degree of understanding, partly because much of the context survives, and maybe you studied the situation in history class. You may have a notion of the context, even though everyone who actually remembered it is dead. But that language in books was written to convey the context, whereas most daily communication assumes a great deal. And, as time passes, even language designed to convey context becomes increasingly difficult to interpret. Language changes over long periods of time and secondary meanings get lost. Many people read Hamlet saying to Ophelia "get thee to a nunnery" and think he means a convent, that she should become a nun. It is lost on us (unless we study it) that "nunnery" was Elizabethan slang for a brothel. He is saying she belongs in a brothel. The predicate term "nunnery" behind this imperative sentence has undergone a transformation in connotation.

It's similar with place. *Where* you say something may be as important as *when*. If we are walking through the woods, talking about work, and I say "he won't get to first base that way," you will assume I mean that our co-worker is wasting his time. If we are at the baseball stadium and I say the same thing as a player misses a bunt, it means I don't think he should bunt. If I am in New York and I say "It's on 42nd Street," it means one thing, but if I'm in Oklahoma City, it means something very different (and a lot less exciting).

Thus: All meaning moves, across time and place.

Generalizing

We see that both connotation and denotation are moving targets, and we have to remember that when we generalize. We can generalize over time, or place, or any of Aristotle's other meanings of "is." The denotative term in "the cat is on the mat" can range in generality from picking out just one cat on one mat (in the instant the proposition was judged functionally true), here and now, or it can take in every cat, possible and actual, everywhere and at all times, as when we used "the mat"



as a metaphor for the earth's surface. Consider, then the following:

Kingdom: Animalia
 Phylum: Chordata
 Class: Mammalia
 Order: Carnivora
 Suborder: Feliformia
 Family: Felidae
 Subfamily: Felinae
 Genus: Felis
 Species: ***Felis catus***



Fluffy

As you can see, there is quite a process of generalization in getting to what might be meant by "the cat" as a denotation. I might mean "the cat" insofar as it is just *an* animal, *among* animals, so I could mean even something as broad as the animal kingdom. Someone, maybe a veterinarian who has to vaccinate all the animals in a house, says "just bring me the first animal you see." Perhaps I bring Fluffy. The assertion has succeeded. The purpose was to begin a process that would eventually include all animals in the house, perhaps even gerbils and snakes and parakeets, and Fluffy is, after all, an animal. Check the chart. The vet might have said "bring the cats first." That would eliminate the dogs and the rabbits and the gerbils. (Do you vaccinate rodents?)

But it isn't even as simple as that. There are other ways to generalize about Fluffy. Remember, Fluffy is a vertebrate. That isn't on the chart. It belongs to a different chain of generalizations. Fluffy is soft. There are many other soft things in the house. Fluffy is white and orange. There are other white and orange things. Fluffy is smart, and there are other smart things in the house. We can rank them by smartness, or softness, etc. There are lots of ways to classify Fluffy. The vet might say "bring me the gentle ones first." Now you are classifying your pets from gentlest to most likely to bite. Can you feel your brain moving the pieces around into a series? As you can see, the vet might arrange the pets in about a thousand different ways, depending on what is needed, and you already know a lot about how to act on the generality.

You can also generalize over the history of some group of people. When Captain Renault famously says, near the end of *Casablanca*, "Round up the usual suspects," he is creatively generalizing.



<https://url.ryanbooks.com/DDcK9>

His command might or might not include Rick (Humphrey Bogart's character), but his men interpret him otherwise. That was clearly his intention. If I say "bring me the cat who threw up on the mat," the case is similar. But at my house, that requires bringing four cats, not one. I didn't say "the cat who *last* threw up on the mat." As you can see, the predicate term is crucial in generalization.

The vagueness built in to the denotation-connotation relation enables people to take what they want (often without thinking) from what they have been told, or have read, unless we further refine the denotation and connotation. The copula helps somewhat, since the tense (past, present, future, etc.) can convey time setting, while the number (plural or singular) can convey some information about quantity, and the category (from Aristotle's ten) can tell us something about *how* the predicate is modifying the subject. One way to express this last one is to assign a number to the copula, as we have already been doing:

The cat is₁₀ on the mat.

That would tell us "as acting." We will want to do that, but it is only part of the problem, since we express tense and singular or plural as part of "is" in regimenting the proposition. As you can see, this designation of "is" tells us very little about how to understand the level of generality the speaker intends.

To be frank, there is no failsafe solution to this problem of meaning. No matter how you understand the level of generality, the connotation and denotation together may leave open a lot of options. When someone asserts something, including when *you* do that, context has to do the rest of the work. In the earlier example, we can easily imagine the veterinarian saying to a child "bring the first animal you see" and the child brings a stuffed plush toy cat. The kind veterinarian will almost surely pretend to give it a shot, but the child has, after all, fulfilled the request—in denotation, connotation and copula. The reference she has generated in her mind is functionally true (succeeds), in the sense we have defined it.

The *reference* does not come through, as an assertion, in light of the veterinarian's purpose, but the child has not made a mistake, as we can all see, even if her offering of a plush toy turns out functionally false. Only the context has been misunderstood. The problem was in the vagueness of the veterinarian's declarative sentence: "you should bring the first animal you see." For the child that becomes something analogous to:

"I is₁₀ animal."

(bring)

This notation system will not work very well, however, for cases even less clear.



From all this we learn that the very thing that makes language so useful is also its fatal flaw: vagueness. If we cannot eliminate vagueness in language (and we can't), then we must learn how to neutralize it for our purposes. We must at least understand the *range* of generality we are working with when we bring our language into standard form.

Overcoming Vagueness

How can we deal with vagueness? The answer is this: we should *substantivize* the denotation and connotation at the lowest level of generality that is consistent with the purpose of the proposition. I know that's an ugly sentence. Let me see if I can make it clearer. This process of substantivizing requires effort, and it incorporates something the philosopher Donald Davidson (1917-2003) called "the principle of charity." What that means for us is that we interpret everyone's range of generality so that it gives them the best possible shot at being effective, sincere communicators. We assume that whatever has been said or written, the person who said or wrote it *wanted* to be understood and was doing his or her best to accomplish that end, and was doing so for the sake of some purpose. Discerning someone else's purpose is what *context* enables us to do. If we get the purpose wrong, we are in trouble regarding the denotation and connotation (that is, we don't know what we would act upon if we chose to act).

So, as always, we must begin our procedure by making the purpose explicit. In this case:

Purpose = to vaccinate all the (living) animals in the house

Now, imagine (if you can) that the cat named Fluffy is on the mat. How can we avoid vagueness, really, to the greatest extent? Remember, it's possible Fluffy already had his shot. The vet keeps records, but you may not. It is consistent with the purpose to ask, when the vet says "bring me the first animal you see," something like "has Fluffy already had his shot?" But assuming the vet really means to give shots to each and every living animal in this house today, and has done none yet, we might safely "assert" our answer without *saying* anything, by fetching up Fluffy and depositing him on the table before the vet. That is an assertion. But it is not language, and language is what we need to do any logic.

Persuading, on the other hand, can be done by actions. Think of the famous moment in O.J. Simpson's murder trial when he tried on a glove that would have been evidence against him, and the glove didn't fit:



<https://url.rylanbooks.com/LzINp>



Aside from many theories about guilt or innocence, the assertion (trying on the glove) succeeded in the context, and ultimately seems to have served the purposes of the defense and undermined the purposes of the prosecution. But in logic, we must bring our assertions to language, and in learning persuasion, we must be *able* to do so, even if ultimately we decide silence, or action, or refusal in language is better for our purpose.

Consider this form:

The **animal** that is named Fluffy is the **animal** on the mat.

Why have we chosen “animal” instead of all the other generalizations that might apply to Fluffy? Probably because the vet used “animal” in giving us instructions: “the first animal you see.” We are applying the principle of charity. If we see Bartholomew the gerbil before we see Fluffy, and we are uncertain whether rodents are included, the principle of charity will require us to bring Bartholomew. He is an animal. That is in keeping with a part of the predicate presented in the assertion we are acting on. Unless we ask “does that include rodents?” and find out whether it does, charity requires us to act on whatever the original predicate *included*.

In which case, we can put our proposition as such: “The animal Bartholomew is the animal on the table.” I don’t know whether gerbils usually get vaccinations and maybe the vet really meant only “the-animals-that-get-vaccinations” (a fair reference to draw from his sentence), but that requires clarification. I am not a veterinarian. To act on what someone asserts *with charity* requires taking them as literally as possible and not removing or changing *their* generalities and altering their denotations and connotative fields without confirming it.

Perhaps the vet is only there for vaccinating the cats and still said “bring me the first animal you see.” That was too vague, but it might work, especially if one only has cats. If you see a spider on the way to fetch a cat, you might wonder “is a spider an animal?” but you know that even if it is, it doesn’t get a vaccination. But charity suggests it is wise to *consider* the matter. When you guess at what someone else means, you can err.

It is no fun to say only and exactly what we mean, especially in the modern age of irony. But we must have the *ability* to interpret people as literally as possible, to take the time to consider their literal meaning, in order to be charitable afterwards when we generalize and move their meanings around. What we laugh at when the little girl brings the stuffed cat is the irony –it fulfills the request with an “or” we hadn’t foreseen: “living or otherwise.” But recognizing it was *within* the literal meaning of what was said, although clearly outside the way purpose is embedded in context, we experienced a small jolt to our habitual determination of context and saw that the child had (innocently) fulfilled all the requirements. If an adult does the same thing, the irony is clear and will be understood as intentional (and is still funny).



Substantivizing to Limit the Range of Generality

Making the the range of generality explicit by adding the same substantive to *both* the subject term and predicate term makes our interpretation as clear as possible, and it holds the subject, predicate, and copula constant while our reasoning proceeds. It is not a science, but more of an art, or at least a good habit. Yet, with practice you can get good at it. It may surprise you how much this practice helps you interpret others charitably and also clarifies your own thought (when you have confused your own level of generality). It's also kind of weird at first, but then you get used to doing it.

Consider these examples.

The election is always the first Tuesday in November, in even numbered years.

Expanded and substantivized:

The **thing** that is the election is, the **thing** on the first Tuesday of November in even numbered years.

Remember that time is number six on Aristotle's list. Is that expansion good enough to hold our subject, predicate, and copula constant? It might be, depending on context and purpose. If someone has asked "when is the election?" that might be a good answer. But it might not be. Perhaps what was sought was the date of the *next* local election, which might or might not be on that day. It might be in April, for example. The answer we gave has supplied the recurring date of the Federal general election in the USA.

If context and purpose make clear that the information sought was this very information, then we still might have spoken with greater generality than we needed. Yes, an election is a "thing." But it is also an event, an occasion, an occurrence, a process, a choosing, an elimination, and many other more specific categories than "thing." If context indicates that the assertion we are seeking to understand is the election as a calendar event that we may want to act on, our substantivizing is unhelpful, and the election is not best treated as a "thing." A better expansion might be:

The **event** that is the election is, the **event** occurring on March 17, 2020.

(I am writing this in late November of 2019, in Illinois.) That answer might be too specific, if the assertion sought not the *next* election in Illinois, but (perhaps) the next *major* election, or you might add some other limiting factor. Given that it is obvious that the question seeks the temporal location of an event, using "event" is probably the most charitable substantive expansion. If the assertion sought to understand something about the election as a process, or as a right, or as a choosing or elimination, a different substantive expansion would be in order.



When choosing a substantive for your expansions, you are asked to generalize. It can be useful to use “thing” first, since it is all-encompassing, and state the expanded proposition using “thing.” Then you look at the proposition and ask: What sort of *thing* is an election? (or a cat, or whatever the subject term is). Answer: it is an event, a process, etc. —make a list. Now, looking at the list you generated in answering “what sort of thing?” ask which substantive term most closely corresponds to purpose and context, and then plug that substantive term into both the subject and predicate as an expansion. Then add the subscript to indicate which sense of “is” you have chosen.

A Tortured Proposition

You now have something pretty ugly, but much clearer than you started with. The vet said “bring me the first animal you see.” You assert, in language, “The **animal** that is₁ Fluffy is the **animal** I see first.” It may not be obvious at this moment why these expansions are needed, but that will become clearer when we begin to transform subjects and predicates in the two ways that characterize the *formalization* of the real process of thinking.

You may benefit from making a list of generalizations that are very common and that work well for a lot of contexts (the ten senses of “is” for example), but remember: staying at the lowest level of generality that is consistent with the purpose and context of the assertion will give you the greatest power in your formalizations, while keeping the purpose closely in mind will help in maintaining the greatest charity, and that holds whether you are doing logic or persuasion. The easiest way to generate a list like that is to start with Aristotle’s ten senses of “is” and brainstorm general terms that belong under those senses of “is.” That is what I did with “is₆” in the election example. The lists would be very long. Your teacher will give you examples.

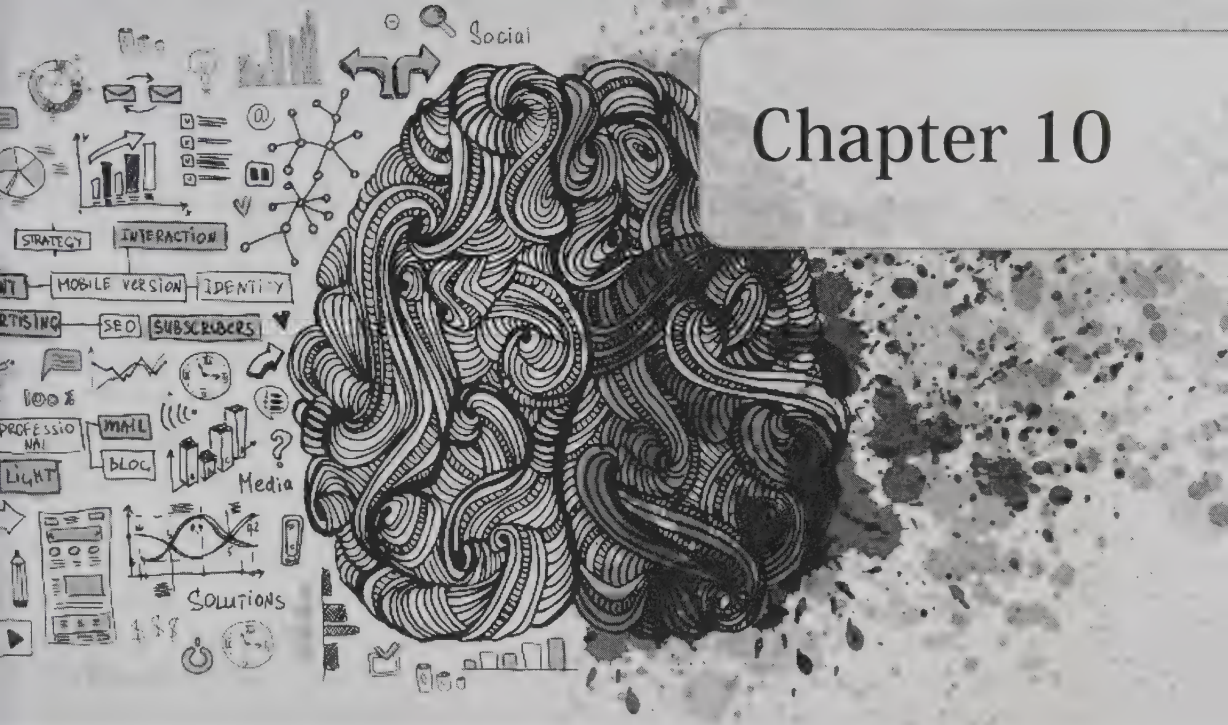


EXERCISES:

1. Turn on the TV news. Write down the first assertion you hear, and hang on long enough to get the context and purpose of the assertion. Write down the context and purpose in ordinary language in a short paragraph.
2. Express the assertion as a declarative sentence, then as a formal proposition, making denotation, connotation, and copula explicit (use the subscript on the copula).
3. Name the reference (the beast) as best you can and imagine releasing it into the situation you drew it from (as if you were talking to the person on TV). Describe that in a couple of sentences. Consider your chances of *success* if that reference becomes an *assertion* and indicate it in a sentence.
4. Looking at your work, expand and substantivize your subject and predicate with the most charitable generalization with which you can tie to the context and purpose.
5. Does this expansion change the likely success of your assertion (it may not, but it may)? Write your answer and explain why or why not. (That is, what will happen to the expanded, substantivized version?)
6. Repeat 1-5 but instead of turning on the TV, start with the last assertion in your text messages (nothing private please).



CHAPTER 9



Chapter 10

QUANTIFICATION

Designating a Referent

We have learned how to produce references, and we have learned that if we release these into the world as assertions, people may act on them immediately, they may ignore them, or they may notice and interpret them for future purposes. In this last case they may ask questions of clarification, and one question will be uppermost in their minds: **how many of the things in the world referred to by your proposition should they act upon?** OK, they probably won't ask it that way, but they definitely need to know whether you want them to act on *all* of the references or just *some* of them.

Up to now all of our propositions have been vague about *how many*, in this sense. Note that this matter is different from the Aristotelian category of quantity (the 2nd sense of "is"). The category of quantity is one sense of the word "is" but that means that the "is" just is



some kind of quantity—like six is (as a quantity) greater than four, or the henhouse has (as a quantity) twenty-four roosts, or Lincoln was (in the numerical succession) the 16th President. That's not the game here.

The other sense of “how many” is a *set of instructions* about how to act on a reference once it has been asserted. Given the reference we can find by making a proposition from the assertion, does the proposition being asserted require you to act on **all** of the class of things included by that reference? Or just **some** of the things in that class? Or maybe even **none** of the references, if it was a negative proposition, “like don't touch those cookies!”

When you transform your reference (the outcome of your formalized thinking) into an assertion, it takes up a relationship to things in the world of action that are called “referents.” We will use the word “designate” for this relationship. **The referent is anything that can be designated by the reference for the aims of action.** This is similar to denotation of the subject term, but different. The denotation tells you what *term* to think about. The designation tells you what to act on. They may not be the same because the designation comes from the reference, and it includes the sense of “is” and the connotative field. So you don't act on a subject term, you act on a referent.

There are many possibilities for designation, but the key is that we must know whether the person making the assertion aims to include *all* actual referents, to include only *some* (excluding others), or to *exclude* all referents (that is how “none” works—it sets up a reference, designates a class of referents, and then says stay away from all of them). I will explain more clearly in a moment.

Up to this point all of our propositions have been “indesignate” propositions. That means that once we looked at denotation, connotation, and “is,” and have named a reference (a beast), we left it vague as to how many candidates in the world of action should be acted upon. When people use ordinary language, they count on context, or on tone of voice, or demonstrative pronouns (these, those, this, them, etc.), or the definite and indefinite articles (the, a) to make their quantification obvious enough for people to act on. For instance, there is a huge difference between “the cookie” and “a cookie.” The first designation probably includes pointing, or a cookie isolated from other cookies, or some obvious reason to think that we need to refer only to one such food item. The second designation suggests *any cookie at all*, and that is hardly the same thing.

In persuasion, it is often an advantage to leave one's statements “indesignate” and allow audiences to fill in the quantities they imagine. We will discuss this later, but it is not adequate for our thinking in logic to leave our references indesignate. We must anticipate what others will hear (and interpret and even imagine) when we make our decision as to how to form our assertions. (Remember when I asked you to imagine what you looked when you were thinking? Well, now you have to anticipate that and be confident that others get a clear message from your self-

presentation.) We must think it through and not leave quantification to chance or context unless it fits our purpose. That means we must decide and *know* “how many of the referent class” –all, some, or none— we mean to include, even if we don’t say it explicitly.

Stuff that Isn’t Very Important

We will not spend very much time on the idea of the “referent.” There are logic books that get all worked up about instances in which we successfully formulate our proposition and bring our connotation and denotation into convergence, and yet are unclear about how anyone would act on an assertion related to the process. For example, if I said “give that spatula to the present King of France,” you will have a difficult time finding the referent (the King, not the spatula –everybody has a spatula). They say there is no “extension” to the class defined by the reference –that King. It is a waste of time to worry about this idea of “extension,” so we’ll skip it.

For us, the failure to assert something with a clear enough referent just means the assertion fails. If you are thinking about references that no one can act on, then their meanings are just part of your *thinking*, but not suitable for assertion, unless your purpose is only to get someone else to think about the same thing. There is no problem with the meaning of this: “The present King of France has no referent.” You know how to *think that thought* and I do not adopt as my purpose, right now, anything beyond your thinking it. You don’t have to hand him a spatula. My assertion succeeds. Unless an assertion brings us to the point of genuine doubt about what to *do*, there is no point worrying about whether it has a referent.

Quantifying by Enumerating

If I assert “these cookies are burnt.” You might well ask: “all of them?” I might answer, “no, but most of them.” We are quantifying the assertion.

Now, it is important to recognize that we have shifted our focus from the formation of propositions to their assertion, or more exactly, to **the conditions of their clear assertion**. From here out we will speak of propositions asserted. But we do not include the referent, since I don’t actually want you to do anything in the real world, except your homework.

We will be concerned with only the enumeration of the reference (the thing we named). We are not counting or measuring things in the real world. That is what Aristotle’s category of quantity does. We are supposing how to make our reference into a clear assertion, treating it *as if* it has been asserted, but *not yet* asserting it.



We are not quite finished with the process of thinking, but from here on, propositions will be treated *as if* they were public property, as if they have been asserted, or are being prepared for assertion. A proposition brought to fruition in a reference (the beast you name) may never be asserted, of course, but the ones that interest us in logic and persuasion are *prepared* for assertion. You won't be persuading anyone with your private thoughts and you can't show your logical analysis without making the proposition explicit, which means *preparing* it for assertion. That preparation means thinking about the reference in light of how to "enumerate" it.

We have many expressions in our ordinary language that do the work of enumerating what we assert. Returning to the burnt cookies, we might say "almost all," or "hardly any," or "several," or "quite a few," or "90%" or "about half" and the list goes on for "a good while" (which is also an enumeration of time, albeit vague). Anyone can see that these vague ways of enumerating will suffice to facilitate action "in many cases" (see? --enumeration is "very common"). This vagueness about "how many?" can be used to advantage in persuasion. But for now, we need to narrow our options. There are "a couple of" surprises in how this is done by logicians. (Now that you are attuned to hearing enumerative phrases, you'll start noticing them "everywhere" --yes, that is an enumerative phrase too—because they *are* everywhere.)

Logical Quantification

To reduce ambiguity and vagueness, logicians, beginning with Aristotle, adopted **three terms of quantification: all, some, and none (or No)**. These are interesting choices because they bring certain consequences to our thinking.

When I say that "all the cookies are burned," you have every reason to expect that, upon inspection of whichever collection of cookies was designated from the class enumerated by "the," there will not be a single cookie unburnt. If there is one unburnt cookie, then I could revise to "all but one," or "practically all" or some other modified word. But the word "all" is quite unforgiving and inflexible. It really means *all*, that is, *every single one of those designated, that I can enumerate from the reference*. It sets a high standard for successful action. We can declare it like this:

"All the cookies are burnt."

We can regiment and expand it like this:

All the food-on-the-pan that is a cookie is_g food-on-the-pan that is burnt.

You see that I have chosen the generalization "food" for expansion and the sense of "is" that Aristotle calls "condition." My beast is food-on-the-pan. I could make a serial predication by adding a second proposition:

"All the food on the pan that is burnt is_g food-on-the-pan that is rock hard."



And another, changing the sense of “is”:

“All food-on-the-pan that is rock hard is₉ food-on-the-pan you can’t eat.”

And you see that using a “not” (“can’t”) ends the chain of thinking and sends us into reflecting on the whole of what has been asserted.

You can work out from this that my purpose is probably just to describe, with that first proposition, but when you include the whole serial predication, perhaps my purpose might have been to warn, or even to forbid. With a different tone of voice, such as “All these cookies are burnt!!!” I might have adopted as my purpose to blame, in which case I might choose “is₉” for the whole series, to make explicit that *someone did it*. But choosing the conditions for the meaning of “is,” my purpose was probably to have people refrain from forming an expectation that they will be eating these cookies.

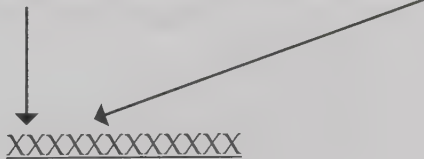
You can also see that generalizing the cookies higher than “food” would go beyond what is needed for the desired action (or non-action). The expansion “food” also helped me get a good name for the beast, the reference. I moved the reference up into the proposition (in presenting it above) because I need space below it for something else, as you will see. But considering just the expansion, “food,” if I expanded using “things” or “objects” instead of “food,” in order to make good sense, my purpose would need to be almost scientific (or something similar), since “thing” or “object” suggests an unusual detachment from the cookies and how cookies are usually acted on. (And I feel confident that you know how cookies are usually acted on.)

If I expand with “things” instead of “food” you might reply “they’ll make serviceable hockey pucks.” Or “scrape the black from half of ‘em and we can play checkers with ‘em.” You are here playing on the vast space opened by the term “things.” Burned *things* could be experiments, or art, or counters, or game pieces, or weapons, or if round and hard, usable for whatever we normally use round hard things for, including hockey puck, frisbees, projectiles, coasters, and so on.

All: The Universal Quantifier

Let’s adopt a way of symbolizing these quantifiers, beginning with “all.” We may formalize our proposition as follows:

All the food-on-the-pan that is a cookie is₈ food-on-the-pan that is burnt.





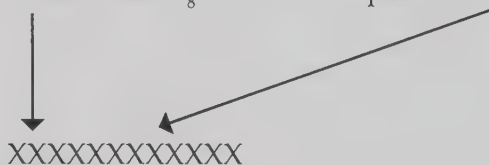
You can see that the denotation and connotation converge on a series of x's where the reference was, in our earlier diagrams. I think we can name the reference "the-cookies-on-this-pan" or something similar, as we did, and then generalize "cookies" to "food" for an expansion. Above I collapsed the beast-name (the reference) and the expansion, since the expansion always includes the beast-name, as well as the second or third reference you may name. In this diagram, the x's stand for the cookies as **referent** (it doesn't matter how many there actually are), and we underline *all* of the x's. This is how you should think of "all." Of the candidates for reference (the class of referents) we mean "all" of them are candidates for action (even if we haven't asserted anything yet).

This "all" is called "the universal quantifier." The choice of the word "universal" is a little bit unfortunate, since it doesn't really have to mean "every cookie in the universe," but that is the word the logicians have chosen for "everything currently under consideration," and that is, in this case, the cookies-on-this-pan, where that limitation (what's on the pan) is treated as a universe of its own, a universe of discourse. If there is a cookie half-on the pan and half-off, we'll cross that bridge when we come to it. And we'll come to it in a later chapter.

Some: The Existential Quantifier

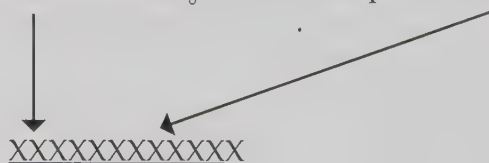
We might instead say:

Some of the food-on-the-pan that is a cookie is, food-on-the-pan that is burnt.



Here you will notice that *some* x's are underlined and *some* are not. We could have done it this way:

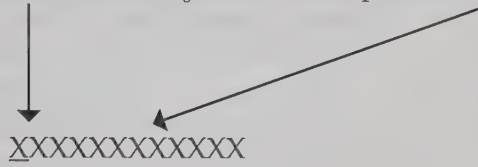
Some of the food-on-the-pan that is a cookie is, food-on-the-pan that is burnt.



Only one x isn't underlined. That is still "some." The meaning of "some," if we are generous and logical with the word, is the sliding scale between "all except one" and "at least one." So, we might also have expressed it this way:



Some of the food-on-the-pan that is a cookie is₈ food-on-the-pan that is burnt.



That feels a little odd in both cases, since it seems more precise to say “all but one” or “just one” in these two cases and to reserve “some” for cases where “two or three,” or “most except two or three” are intended. But in logic, long, long ago, they decided to generalize the word “some” to mean “at least one, maybe more (and perhaps even all).” We will get to the “perhaps” part in the next chapter.

For now, you have to do something, and I hate having to ask you: accept this distortion of the word “some” so that for you, from now on, it means “at least one.” I know you wouldn’t normally use it that way. I apologize, but I have more to apologize for than just this. We have to *keep* this meaning: “Some” means “at least one.”

Back in the long ago, when people did not grasp that thinking is a metaphor for the world, Aristotle observed that when you say “some of the cookies are burned,” it is impossible to evaluate your assertion unless there *actually are some cookies*. Weirdly, that isn’t always the case when we use *all*: “All unicorns have one horn” looks like something we can evaluate even if we can’t find a unicorn. Not only can we *name* the reference, we can quantify the proposition. Yet, we can’t act on it, except in our thinking; but we know that if we *could* act on it, if someone said “catch that unicorn,” we have to catch a horse with one horn.

So, people reasoned that you can talk sensibly about whole classes of things, and their characteristics, even if no examples of the class can be found in the world, no referent. For another example, “angels are genderless” or “the gods are angry” or “our unborn children will suffer,” or many more such examples that you can’t really act on, except to think about them. The reason there is a difference between *naming* a reference and *finding* a referent is because we can think about more things, meaningfully, than we can now act upon. The Kings of France are all in the past. I can’t hand them any spatulas. Our unborn children are not yet, so I can’t tell whether they will suffer, nor do anything *directly* to relieve them. The unicorns never existed at all, I assume, so I can’t catch one, now or ever. But I know what the words denote and connote, and I can find an acceptable sense of “is” even though these “things” are not in the real world.

But what about those who say “it’s nonsense if you can’t find a referent, or if there is no ‘extension’ of the class defined”? These folks confused denotation-connotation convergence (reference) with referent. There is no problem with the reference in any of these statements, only with the referent. And that is a problem only if you were expected to act on the referent in a way that requires finding one in the world. In fact, there is no problem here at all.



But, unhappily, due to the confusion of reference with referent, those bad logicians called “some” the “existential quantifier.” What they meant is that when you use “some” in an assertion, the truth of your assertion depends on there being, in the real world, at least one entity of the sort your assertion denotes. They were wrong. It exists if you can *think* about it, because thinking about it is enough. Your thinking exists, along with whatever you are thinking about, and logic is about thinking *well*, not about catching unicorns or handing spatulas to dead kings.

So it is a mistake to think that using “some” requires things to exist in a stronger sense than using “all” requires, but the mistake is very old. 2500 years. Most philosophers *still* believe that “some” has “existential import” and “all” does not. You may have to humor such people if you run across them. You could point out that your *thoughts* surely “exist” in *some sense*, and that they exist *in that same way* whether you are thinking “all” or “some” or even “none.” Do not expect the old logicians (whose proper home is in the past) to be impressed by this undeniable point you made. They have been taught the contrary; Aristotle said it; people have been allowing it was right for 2500 years, and you are not going to be allowed to change it, even though they are wrong. I, on the other hand, am trying to change it. I am not the first, but no one has succeeded in educating these hard-headed people up to now, so I doubt it will happen now either. On the other hand (or I guess it’s a third hand), *you* can follow your common sense in your actual life and leave these hard-headed people to their impractical illusions. You will, however, need to know that when you hear the phrase **“the existential quantifier,” it just means “some,” and “some” means “at least one.”**

Singular Denotation-Connotation

There is a weird thing that happens when your reference (the convergence of the parts of your proposition) is *supposed* to have only one referent in the actual world. I have emphasized the word “supposed” here because I want to be sure that you understand it is a *supposition*. It’s a way of intending that there be one and only one referent in the real world that is to be acted upon if the assertion is successful.

It is fairly easy to succeed in your assertions where something is right at hand. If I say “this cookie is burnt” while holding it in my hand, pointing to it with the other hand, and making my assertion for the purpose of description in a given moment, then much of the connotative work is being done by the interpretive context and not much is likely to go wrong. Yet, consider the prospects.

Being the way I am, when someone makes a very clear singular assertion like this, I sometimes like to call attention to this singularity by replying in such fashion: “oh, you mean the cookie in your hand.” This usually results in a look of irritation, at which point I add “why didn’t you just say so?” My companion here usually will insist that this was obvious. To which I reply, “sure, but you didn’t *say it*.” My friends have learned to be patient with me.

The most interesting and useful instance of singular reference is the use of *proper names*. If I say “Thomas Jefferson built Monticello,” I have used two proper names in one declarative sentence. Parsing it as a proposition is informative. You know, as everybody does, that there is *more than one* person named “Thomas Jefferson,” and perhaps there is even more than one person of that name who built something named “Monticello.” (Perhaps a little boy in New Mexico was named Thomas Jefferson and built a huge ice cream sundae he named “Monticello” before eating it . . .) But the point is that one and only one such person is the reference here: “*The*-Thomas-Jefferson-who-built-*the*-Monticello.” Now, I can’t act on him, because he’s dead, but I can write about him, think about him, slander him, praise him, admire him, doubt his truthfulness, form a general opinion of him, and many other things. I might like his house, I might not, but I can’t really change that he “built it.” (Actually, he hired people mostly, or enslaved them, but he designed it and paid to have it built, or ordered his slaves to build it, right?)

As for knowing who we are talking about, it’s one and only one person (however dead he may be). If there is any doubt as to who I am talking about, I can always add details. *The* Thomas Jefferson who wrote the *Declaration of Independence* in 1776, was over 6 feet tall, had red hair until it turned white, and died on the 4th of July, 1826. Are we clear yet? Some logicians say that you can keep adding details until the “definite description” picks out one and only one person in the world. But that isn’t very important. What counts is that, as a matter of our purposes, and as formalized in our logical formulae, we *suppose* there is only one referent for our reference. If we are wrong, no big deal, we can refine things as much as we need to. Our aim here is to *suppose*, not to verify what we have supposed. If you are still thinking about a different TJ than I am referring to, well, let’s just see if that difference has any practical consequences.

When we *suppose* that there is only one referent, we have to use the universal quantifier:

All persons who is_(1 or 5) [the] Thomas Jefferson is₁ (_{or 5}) the person(s) who built [the] Monticello.

This makes for ugly English, but clear logic. Note that the sense of “is” is Aristotle’s first category, “substance.” One could use “identity,” the fifth category, if our purpose was to situate Jefferson among the class of architects of famous houses, or maybe to help people pick him out from a list of house builders in 18th century Virginia, or people who happen to be named Thomas Jefferson, but assuming we are only conveying information, this is a classic case of is₁. The use of [the] is to amplify the unique boundaries around this proper name. One famous philosopher decided to call such names “rigid designators,” which sounds like the name of a forbidden racy website. He was trying to indicate that this name picks out one and only one person not only in the actual world, but also in every *possible* world.

That seems excessive to me. I don’t think I care to act on things in any world



apart from my own, if indeed I ever *could*. We know how proper names work in the world of action and it is rarely a practical problem even in our world –maybe when the TSA blocks some poor guy named Muhammad Khan (which is basically Arabic for John Smith, or Kim Park Lee, or Vijay Patel, or Zhang Wei) from getting on a flight. There is no need to get worked up about our ability to draw a circle around an individual being, human or otherwise, and to give it a proper name. We can reasonably expect that name to be a practical way of using language to designate that and only that unique entity.

We understand that, because it is *language*, it can always be used in some other way for some other purpose. But what we have learned here is that we use “all” to quantify singular propositions, and we do so by creating an expansion that is a class of one, [the] person Thomas Jefferson, or [the] person who built Monticello. Thus we formulate: All persons that are Thomas Jefferson are persons who built Monticello. Got it? It isn’t “some.” It’s “all.”

None: A Big Mess

I have deliberately avoided up to this point introducing negation into our thinking. The reason is that negation functions in a number of ways, and we must learn to think about each major function of negation on its own terms.

The first role of negation we encountered was when we discussed serial predication. There I said that entering a negation puts a halt to the series and sends us into reflecting on the whole series (everything that has been stuffed). And so it does. The reasons for that “cessation of the flow of thought” are both psychological and logical.

Psychologically, a “no” throws us into reflection, and leads us to encapsulate and draw a boundary around what we have just been thinking. That’s what I already brought to your attention. Logically the series stops because once we enter a negation, the series has no further implications along the path we have followed. Returning to Royce’s quail hunt, I remind you of his thinking, with the pauses:

The brush is too thick. No dog could get in there. **[short pause, completed thought]** Yes, my dog could. He will go anywhere. **[long pause]** But last month he failed to get through some such thorny underbrush as this. **[full stop, completed thought]**

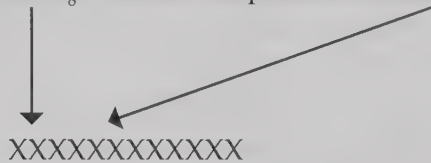
You have had similar experiences many times. Every time you say “no,” you need to pause and start over. In this case, Royce’s thinking is in conflict with itself, and when he says “no” in some way, he has to back up and start again. We do this so quickly that we don’t notice it, but the process is sort of like punting in American football. We have run out of downs and now we have to move the other direction for a while. If you carry your serial predication through to an affirmative end, you scored. Touchdown! You arrived at the idea you were seeking. All of your

intervening steps disappear as middle terms, and your starting subject term is connected to your ending predicate term.

Now we have arrived at a second role for negation, very different from the first. In this case the aim is to *quantify* the supposed referent(s) at **zero**, or at least to forbid action upon whatever is in the referent class, so zero action. This is complex because the proposition, since it has a meaning, seems to suggest that there might be some reason to *suppose* a referent, but *then* it says “in spite of that reason, there is nothing in this group to act on, and so we won’t even try to pick something out.” If I pull the cookies from the oven and say “none of these cookies is burnt,” you may wonder why I said that, since it means we can eat all of them. But you will (psychologically) interpret and then judge that I had *expected* burnt cookies and was commenting on the *unfulfilled* expectation.

So, returning to our earlier example, then, we might say:

No food-on-the-pan that is a cookie is₈ food-on-the-pan that is burnt.



Notice that none of the x’s is underlined. But the proposition still has meaning (at least it has *some* meaning). The situation is that those x’s are perfectly sensible candidates for being burnt (which we can learn from context), but as a matter of fact, going through them one by one, we see that each is *not* burnt, and that adds up to *none* burnt. If even one cookie is burnt, we made an error. Because “some” (at least one) would be burnt. If we release the assertion with the “none” quantifying it, into the world of action and someone can point to a burnt cookie on the relevant cookie sheet, then our assertion has failed, but the failure in this case is a bit more complex.

The assertion “No cookie [here] is burnt” suggests, in assertion, that all are fit to eat, at least so far as being burnt would disqualify them. So the context of “No cookie is burnt” has a positive *complement*, “all the cookies are edible.” We all understand this complement *along with* the assertion, and the failure of the assertion, if it fails, is actually the failure of the complement, insofar as being burnt is concerned. They aren’t all fit to eat. Perhaps the cookies are not edible because they are poisoned or someone put in salt where sugar was called for, and so on, but that doesn’t affect the assertion “no cookie [here] is burnt.” The only thing that affects that assertion is when someone can point to a burnt cookie among those intended.

I like the word “burnt.” It sounds sort of British or Canadian or something. Like “learnt” and “whilst” and other very cute things those people still say, for some reason. I mean “burned” would have worked just as well for this example, but since “burnt” doesn’t have a little red line under it in Microsoft Word, and they don’t



autocorrect it, why not splurge, you know? And after all, the US still uses the “English” system of weights and measures—a miss is a good as mile, measured in furlongs per fortnight—and I can’t see that as anything but cute, these days. Pass me a peck of those peaches.

So how is this use of “none” supposed to be “quantification”? “None,” or “no,” in this sense seems to be the absence of a quantity rather than the presence of one. This comes to a complex point. I will start a new paragraph now to emphasize this new point.

To have a complete thought, one must shuffle through all the possibilities, and one of those is that our thinking sometimes reaches a limit when we have checked the candidates for a certain denotation-connotation-is complex and have found that the reference they converge upon does not designate a referent. The lack of a referent is not so much a failure of assertion (since we might not assert it) as a positive conclusion that nothing is available to be acted on. Sometimes this is the most valuable information one can imagine. It is the outcome of good thinking, not bad thinking.

So, when you consider “No” or “none” alongside “some” and “all” you have a method for thinking about any quantity of the x’s you might encounter. Just as “all” is a “universal quantifier,” so is “No” or “none,” because (in the same uncomfortable way) all the items in the universe you started with (cookies on the pan, in this case) have been enumerated and *accounted for*. Not one is burnt, and this is what “none” means, as a quantifier. We express “none” with the word “No” at the beginning of a proposition. “No s is p.” That means “None of the subject [cookies] belongs to the predicate class [burnt].”

Thus, we have the following quartet:

Universal affirmative:

All food-on-the-pan that is a cookie is_g food-on-the-pan that is burnt.

Singular affirmative:

Thomas Jefferson, who is a cookie on this pan, is burnt. (I named one of the cookies Thomas Jefferson.)

Existential affirmative:

Some food-on-the-pan that is a cookie is_g food-on-the-pan that is burnt.

Universal negative:

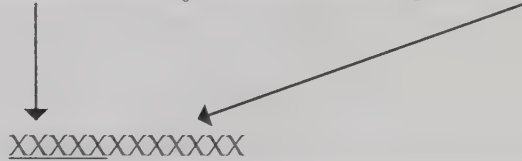
No food-on-the-pan that is a cookie is_g food-on-the-pan that is burnt.

That might lead you to feel that you have pretty much covered all the possibilities, especially since “some” covers the cases of: almost all, hardly any, quite a few, and so on. And, recall that “all” covers the case of unique entities with proper names. But you have overlooked one possibility, and it is the most important and most difficult to think through.

Some Is Not

The easy thing to overlook is that **we can also say no to the predicate term**. Where our “No” and “none” above says, basically, start with the subject term and check to see if any of the denotated x’s fulfill the connotative conditions set by the predicate term, you could also begin with the predicate term and check to see if at least one of those x’s is *not underlined*.

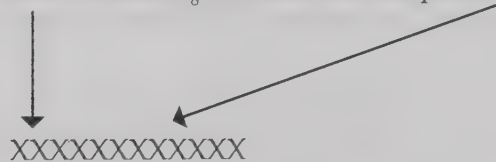
Some of the food-on-the-pan that is a cookie is_g **not** food-on-the-pan that is burnt.



This is not easy to think about. As you can see, we have separated the denotative and the connotative functions of the subject and predicate terms. The denotative function is pointing to the some that *are* burnt (perhaps), but what we are concerned with here is the x’s that are *not* underlined. When you say “Some [subject term] is not [predicate term],” the meaning of the proposition is this:

1. At least one of the candidates for denotation by the subject term is not covered by the connotative context circumscribed and limited by the predicate term.
2. It is possible that not one of the candidates for denotation belongs to the context circumscribed by the predicate term –we have said nothing about whether the *denotative* term does or does not land on an x. Maybe it does, maybe not. So this is also *consistent* with our proposition:

Some of the food-on-the-pan that is a cookie is_g not food-on-the-pan that is burnt.



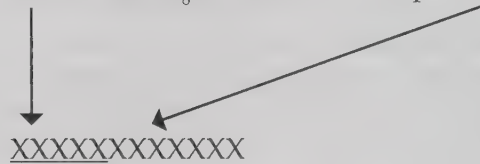
The word “consistent” means that two propositions can successfully refer (reference, not referent) at the same time and in the same way. Sometimes it means that there is at least one x that isn’t underlined and maybe some that are. But in this case, with “some s is not p,” we might be telling the truth even where there is *nothing* underlined. So it is also the case that No s is p, when that happens. “Some s is not p” is consistent with “No s is p,” and we will have to sort that out in a later chapter (actually, the next one).

In the case of “some s is not p,” our proposition about the cookies has the same meaning regardless of whether the *denotation* finds an x or whether it doesn’t. That is weird. It shifts the burden of meaning to the predicate and the connotative field.

This kind of negation is an invitation to “think backwards.” **It is the most valuable kind of thinking for both logic and persuasion –and the most difficult.** You will see. The backwardness of it is: starting with a connotative field, you work your way through it to see what it does and doesn’t *include*, and it feels weird to start there and work that way. We will be spending a lot of effort on this process in the chapters to come.

For now it is enough to recognize that the “not” in “Some [subject] is not [predicate]” is different from the “No” and “none” in a universal negative quantifier, and it also does different work from the “Some [subject] is [predicate]” type of proposition, the existential affirmative. What is the nature of this weird “not”? That is a complex question because it requires the full schema to grasp this “not”:

Some of the food-on-the-pan that is a cookie is₈ not food-on-the-pan that is burnt.



The subject term and its denotative function have both been set aside. Nothing has been said about them one way or another. We assume they denote something, but we don’t really care. The only aspect of the proposition under consideration is the predicate term and the connotative function, but the sense of “is” remains important, because it tells you something about the purpose and helps you circumscribe the field of connotation, draw a circle around it to understand what sorts of x’s these are (not-burnt x’s). And to discover one x of the sort that could be a candidate for this field of connotation (on the basis of the denotation), but which *happens* not to be included in that field of connotation is what tells you that the proposition is functionally *true*. In other words, if you see at least one cookie that is not burnt, you know that it is functionally true to say that “some of these cookies are not burnt.”

So, there are some supposed cookies on a pan. If you *cannot* discover an excluded instance, one that is not burnt, the proposition is functionally *not true*. I look at all the cookies, and each one is burnt. So it is not true to say some are *not* burnt. This is not quite the same as saying “functionally false,” which means you can’t act on an assertion, as we have taken the trouble to explain in earlier chapters. It means that when you successfully think about the denotation and the assertion together, you can see the class defined by the subject term and at the same time see that within that class, at least one element (cookie) is not part of the connotative class, and maybe not a single element is, but certainly at least one is not and maybe more. This kind of proposition is called “existential” and “negative.” I do not like this terminology, but I cannot change the world. I can only warn you about it.

I know. This all sucks. How will you ever remember it, even if you are sort of getting it now? We will practice it.



So you now have four kinds of quantified propositions:

All food-on-the-pan that is a cookie is₈ food-on-the-pan that is burnt.

Some food-on-the-pan that is a cookie is₈ food-on-the-pan that is burnt.

No food-on-the-pan that is a cookie is₈ food-on-the-pan that is burnt.

Some food-on-the-pan that is a cookie is₈ **not** food-on-the-pan that is burnt.

These can be generalized as follows:

	<i>Quantity</i>	<i>Quality</i>
All [subject term] is _n [predicate term]. (includes singular)	universal	affirmative
Some [subject term] is _n [predicate term].	existential	affirmative
No [subject term] is _n [predicate term].	universal	negative
Some [subject term] is _n not [predicate term].	existential	negative

The names in the right-hand column are awful, but that is how logicians (mis) named them. Don't bother to think about it. But you do need to know that logicians call this second part of the name the "quality" of the proposition. This is not "quality" in the third sense of "is," just as the "quantity" is not the second sense of "is." There are infinite variations of quality when we consider the senses of "is" but only two qualities in logic, affirmative and negative. They should have chosen a different label. But, hard as they try, logicians are often unclear even with each other and themselves. From here we can generalize one more time:

All s is p

Some s is p

No s is p

Some s is not p.

If Aristotle is right, that covers all the possibilities for the relations of subjects and predicates. Whether he is right is a matter of grave dispute for about the last 2500 years. He is close enough to being right for our purposes here, but if you are curious about what I think, no, I do not think this covers all the possibilities. But that is a matter for a more advanced class.

But I Disagree

Considering these four options, you can see that each disagrees with the others, either in quantity or quality, or both. If you say "all of the cookies are burnt" (All s is p), you have three options for disagreeing with me.

(1) You could say, "well, at least some of the cookies are burnt" (Some s is p),



which is partial agreement but you haven't gone the whole way with me. You have agreed with me in quality, but not quantity.

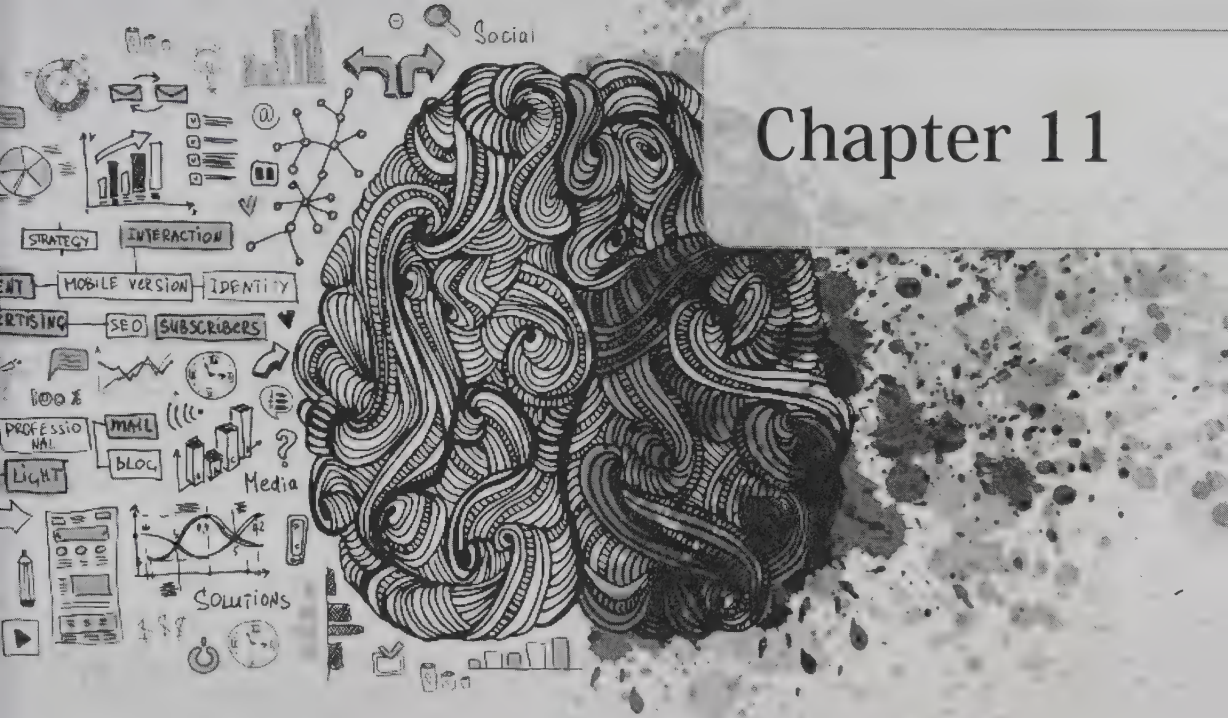
(2) Or you could say "none of the cookies is burnt" (No *s* is *p*), which means we might both be wrong, but we can't both be right. You have agreed in quantity (all and none are both universal), but disagreed in quality (my statement is affirmative, yours negative).

(3) Or you could say "some of them are not burnt," which actually contradicts what I said –if I am right, you are definitely wrong, and if you are right, I am definitely wrong. You have disagreed with me both in quantity and quality. We will spend more time with this in the next chapter. For right now, you have just learned three different ways to disagree with a universal affirmative.

This is just one example. There are three ways of disagreeing with all four types of quantified propositions. The next time you consider disagreeing with something someone asserts, it is valuable to remember that (formally speaking) there are three ways to do it. These options lead in very different directions and your logical reasoning, as well as your persuasive tactics and strategy, will be very different depending on how you decide to disagree.

EXERCISES:

1. Pick up a newspaper or go to one on-line. Choose a declarative sentence and write it out.
2. Is the sentence you chose indesignate (unquantified)? If so, check the context and purpose, choose a sense of "is" from the list, and supply the quantifier you think most charitably fits the sentence. Write the quantifier you choose: all, some, none/No, or some is not.
3. Write the sentence as a quantified, expanded, formalized proposition. (In other words, torture your proposition.)
4. Write out the *other* three versions of the proposition using the other three quantifiers, the ones you did not choose. These disagree with your original proposition in quantity, quality, or both.
5. You now have a full set of four quantified propositions. Think about each of these propositions in turn. If you were going to disagree with the person who wrote the first sentence you chose (after all, it isn't you), you now have three options for doing so. Write the original sentence again, three times (leave space below each). Then disagree with the sentence either in quantity only, or quality only, or both. Write the three ways of disagreeing below the original sentence, and then consider how you might continue your conversation with the person who asserted the declarative sentence. Write the next sentence or two you might speak in each case. (Ask your teacher to show you an example.)



Chapter 11

THE SQUARE OF OPPOSITION

Formal Disagreement

In the last chapter we learned four forms of propositions. Depending on which one has been asserted, you now know about three ways to disagree, formally, with what has been asserted. You can disagree in quantity only (all/none, some), quality only (affirmative/negative), or both. These ways of disagreeing feel quite different and bring different results in conversation and in subsequent thinking.

Most disagreement in ordinary conversation starts out indesignate (because people usually don't state their quantifiers). But in the course of disagreement, differences in quantifiers come out fairly quickly. If I say "the cookies are burnt," and you say "some are ok," I can reply, "well, I meant in general, not that every last one was ruined." It's easy. So, disagreements about quantity are usually easy to understand and clarify and work out.



Disagreements in quality are tougher to pin down. If I say “the cookies are burnt” and you say “they are not burnt” we might be having a heavy disagreement. I might be saying “the cookies are inedible” while your meaning is “I eat cookies this well-cooked all the time, I even prefer them so.” That is the sort of disagreement we aren’t likely to resolve. You eat ‘em, I’m making some more. If the way you like your cookies looks inedible to me, well, we have to agree to disagree. Disagreements about quantity can be addressed by enumerating. Disagreements about quality cannot be so easily addressed, but if we can agree on quantity, at least we have a basis for working out a plan. I will take my cookies out of the oven sooner and leave yours in longer.

But if we disagree about both quantity and quality, our task will be much tougher. You have heard the word “contradiction,” and a lot of people confuse this term with simple disagreement. “Don’t contradict me,” they will say, when your level of disagreement is more limited than full-blown contradiction. You have to have more information to judge and interpret well whether you are really contradicting someone.

To contradict someone, fully and in the true sense of the word, is to disagree in both quantity and quality. You say “none of the cookies is burnt.” I say “some of them are burnt.” You have said that I could go through the whole tray and I won’t find a single burnt cookie. I am saying I did go through the tray and I found at least one that is burnt. So I counter your negative with an affirmative, and I counter your universal “none” with an existential “at least one.” We have nowhere to go. We completely disagree. You might alter your assertion in quantity to create compatibility – “ok, one is burnt” – but to change quality as well as quantity is to abandon everything you meant – “oh, I guess I was completely wrong, not one is burnt.”

In persuasion it is always wise to leave the people you disagree with some room to move and come toward agreement. **Therefore, it is almost always unwise to contradict someone, even someone who is completely wrong.** In logic this is also good advice because, as Aristotle says, almost everything people say, whether it is the wise and well-informed, or whether it is just what the masses of people are saying, there is something to it, something it has right.

People want something when they make assertions. It is almost never pure fantasy. Even liars must dance with telling the truth in order to get what they want. There is almost always some basis in experience or fact for what people say, even when they deliberately lie. Finding that basis is the key to allowing agreement to happen. It is also extremely rare for someone to be completely wrong in every respect, so there is almost never any call to contradict another person formally. Finding a different path than total disagreement in both quantity and quality is advisable. It is also prudent, just in case you are wrong about some things yourself. It gives both you and your companion some room to move.



Thus, we have established a principle we will draw on later: **never contradict someone unless there is simply no other choice** (meaning that you need to believe, before contradicting someone, that *all* actions following from their assertion *must* be averted at *all* costs, which almost never really happens). There is almost always some better path for persuasion and for logical argumentation than through full-on contradiction. There is an old strategy in logic and rhetoric called the “*reductio ad absurdum*,” which is a fancy phrase that just means “demonstrate that your opponent must be caught in a contradiction, of either some universal truth, or some widely accepted belief, or (and especially) contradicting himself or herself. This strategy in both thinking and asserting is to be reserved for only extreme circumstances.

It is also notable that we sometimes come to an impasse *in our own thinking* because we have set up before ourselves a complete contradiction and we feel trapped –there seems to be no middle path. But there is always a middle path –in fact there are always at least *two* middle paths, formally speaking, that are not full-on contradiction (disagreeing in quantity only or quality only). We can allow *agreement*, then, in either quality or in quantity with what has been asserted, holding our disagreement for only one of the two.

The Magic Square

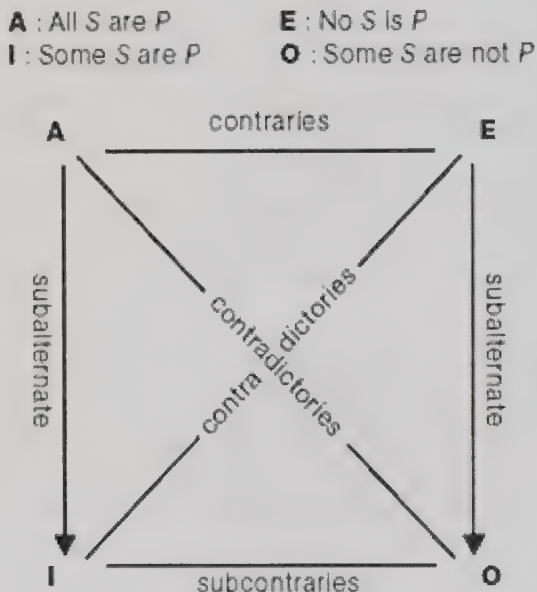
In the Middle Ages, some smart person invented a schema called “the square of opposition.” If that person lived today, this thing would be worthy of a Nobel Prize. It is the single most useful formal tool ever invented for making our thinking processes organized and explicit for our understanding. As you learn the square, you will learn to feel your own thoughts move. They move at a very general level, but it’s still movement. You can definitely feel it. The only thing you need to know from the start about the square is this:

All s is p	= A
Some s is p	= I
No s is p	= E
Some s is not p.	= O

These are just the regular names of the four types of propositions: A, E, I, and O. The use of these letters to name the four types of propositions is traditional, and obviously it just draws on the first four vowels in the alphabet, which makes it easy to remember. There are Latin words associated with these letters, but it doesn’t matter. In this case, it’s just easier to memorize them. There is nothing deeper here to understand. They are just labels. But please note that these are not propositions, they are *propositional forms*. Every proposition takes one of the four forms when it is made fully explicit.



Here is the square itself:



This diagram introduces a few new terms you haven't yet encountered. Let us take the features of the square in turn.

You notice that the propositions with "universal" quantifiers (all and no) are set *above* those with "existential" quantifiers (some and some . . . is not). Sometimes the propositions with existential quantifiers are called "particular." I am going to save the word "particular" to be contrasted with "general," and leave "existential" to be contrasted with "universal." Remember, the terms "universal" and "existential" are badly chosen, but it can't be helped.

Also notice that the two *negative* forms are on the right and the two *affirmative* forms are on the left. It is something you should get used to. Also realize that it could just as easily be done the other way –the universals on bottom, the affirmatives on the right. There is some value, down the line, in experimenting with drawing the square in other ways. It's like turning a chess game around. It looks different if you look at it the other way around. You see things from your opponent's viewpoint. It's also like the way that you notice different things coming down the street from a different direction. So it will be with the square.

The square is your friend. Mr. Square. The square will help you do so many things. Like any friend, it has many sides. Let it be your friend.

So, A is upper left, E is upper right, I is lower left, and O (the most interesting form) is lower right. **Nearly all valuable reasoning begins with O**; it is the creative corner. The relationships in this "tetralogy" (that is what you call a four-faceted relationship) are non-symmetrical in several interesting ways.

The easiest way to think about it is to use the *evaluations* of “True” and “False” for these relationships, but remember that these evaluations are not evaluations of the success or failure of assertions. They are *imagined* evaluations of the references that are converged upon by the denotative and connotative functions, as understood through some specified sense of “is,” for some purpose. But take the same subject term and predicate term, and the same sense of “is” and now compare how logical quantity and quality affect the convergence.

Consequences of Disagreement

A and E are called “contraries.” That means they cannot both be imaginatively evaluated as true, simultaneously, but they might both be false. As with cookies, when I say they are all burnt and you say not one is burnt—No cookies are burnt—we might *both* be wrong, but we can’t both be right. Maybe some are burnt and some are not. In that case we are both wrong. But it’s for certain that we can’t both be *right*. If it’s true that all of them are burnt, it can’t also be true that no cookie is burnt.

That is what “contrary” means. Two statements that cannot be imaginatively evaluated as true at the same time, but we can imagine they could be evaluated as false at the same time. That means they are “contrary,” *not* contradictory. **Contraries differ in quality, but not quantity—both are universal, but one is affirmative, the other negative.**

When you set yourself contrary to another person, you have interpreted that person to be using a universal quantifier, and you have countered with *the other* universal quantifier. It is a very aggressive way to interpret and respond to people. You are saying that the other person has said “all, absolutely every s is a p!” And you have responded with “no, not even a single one of those s’s is really a p.” Or the other way around—you say “not one s is p,” and I say “every single s is a p.” It is a very contentious way of responding. We could both be wrong, and probably we are both overstating our case.

When we say a person is “contrary,” what we mean, if we really know the meaning of the word, is that the contrary person will take up an exaggerated negative position and also exaggerate the positive alternative to create the greatest tension. It is almost never necessary, or productive, or desirable to take a contrary view of things, in this formal sense, because the use of universal quantifiers is rarely a good way to approach a subject. When you say “bats are a nuisance” and I say “they are no nuisance at all,” we have nowhere to go except to admit we could both be wrong. But notice that I interpreted your sentence as “all bats” even though you didn’t say that.

When you say “all s is p,” it is easy to be wrong. It only takes one s that isn’t p and you have erred. I only have to find one unobjectionable bat that isn’t bothering



anyone, off in a remote cave where no one ever goes, and you are wrong. Surely such a bat exists, so you are surely wrong. The same is the case if I say “no *s* is *p*,” because I have to know about every *s* to be certain. All you have to do is find one bat that is a nuisance, to someone somewhere, and I am wrong. Surely such a bat exists, leaving guano in someone’s belfry.

We use universal quantifiers, “all” and “no,” more to *test* generalizations and classifications, than to solve practical problems. Their “contrariety” leaves them in hopeless opposition of quality. Somebody is always wrong and usually both sides are.

Sub-contraries

Things get more complicated from here. The I- and the O-propositions are “sub-contraries,” and that is the oddest idea in all of logic. It means that these propositions can be imaginatively evaluated as *true* at the same time, but we cannot imagine them *both to be untrue*. This is difficult to think about.

But take the cookies. If I say “some of the cookies are burnt” (the I-proposition) and you say “some are not burnt,” we could both be right. But we couldn’t *both* be wrong. If I say “some are burnt” *and I am wrong*, then not one is burnt, and that means that **some (indeed all) are not burnt**. That is the corresponding O-proposition. Some *s* is not *p*. The sub-contrary, the O-proposition, has to be evaluated as true when the I-proposition is untrue.

And vice versa. If I start with the O-proposition and I say “some of these cookies are not burnt,” *but I am wrong*, it means at least one (maybe more) *is* burnt. That is very hard to think about. Let’s slow down.

I look at the cookie sheet, and say “some of these are *not* burnt,” but then I check them one by one, and I begin to realize I am wrong. It’s not just that *some* of them are burnt, all of them are burnt, and I was wrong. But if *all* of them are burnt, then surely it is also true that *some* of them are, so the two propositions, I and O, cannot be *untrue* at the same time.

That isn’t too hard to follow, right? So **the rule of sub-contrariety is that when we assert an I and are answered with an O, or vice-versa, we might both be right, but we cannot both be wrong**. That is a fruitful relationship because it gives us a way of being sure that *someone* has to be right, and maybe both of us are right. This is a very productive, desirable, and constructive relationship.

Sub-contrariety is very different from contrariety where at least one of us must be wrong, and maybe both. We will spend a lot of time with this strange relationship between I- and O-propositional forms as we move forward.



Contradiction

Contradiction means not only full disagreement on both quality and quantity, it means mutual exclusion. If I say *all* the cookies are burnt (A) and you say *some are not* (O), we completely disagree. My proposition is universal and affirmative, while yours is existential and negative. We are in formal contradiction. Look at the friendly square.

The same is the case if I say the *none* of the cookies is burnt (E) and you say that *some are* (I). I am universal and negative, while you are existential and affirmative.

In these cases of contradiction, we are (argumentatively) tightly related. I have taken account of every relevant aspect of what you said and have made it impossible for you to be right at all unless I am completely wrong, and you have made it impossible for me to be right at all unless I am completely wrong. So, if I am right, you are automatically wrong, and if you are right, I am automatically wrong. That is what the word “contradiction” actually means, as I said earlier. To contradict someone is even worse than being contrary, because it leaves no room at all for negotiation. When we are just being contrary, we could negotiate because we could begin by allowing we were both wrong. Contradiction won’t allow that space for negotiation.

You can see why contradicting someone leaves you with no room to maneuver. If you contradict someone in the full formal sense, you had better possess an airtight case and also be prepared to be disliked by anyone listening. It’s easier, no matter how certain you are, to phrase things such that your opponent has some chance of being right. It is exceedingly rare for a sincere person who is trying to know the world to be completely wrong. Everyone knows something and almost every assertion has some basis in experience or fact. So don’t contradict people, ok?

(Unless the person is being a jerk on purpose and isn’t sincere in asserting a proposition. Then feel free to contradict, but you’re probably being a jerk too, and that doesn’t lead anywhere in logic or persuasion.)

Super-alternation

This brings us to the complex and interesting case of sub-alternation and super-alternation. Look back at the square. You see that the A is above the I and the E is above the O. This creates a strange relationship between universally and existentially quantified propositions. They differ in quantity, but they share the same quality (either affirmative, as with the A and I, or negative, as with the E and O).

On the square it just says “subalternate,” but the A-to-I and E-to-O relationship includes a “superalternate,” depending on whether you start by imagining and



evaluating something as true/false at the top and move down (super-alternation), or, on the other hand, start by imagining and evaluating something as true/false at the bottom and move up (sub-alternation).

These are fancy names for something very easy. You do it every day. If I imagine that it is true that all the cookies are burnt (the A-proposition), then it is easy to see that I also imagine *some* of the cookies are burnt (the I-proposition). Same thing happens if I start with the E and move to the O. So a true A-proposition includes a true I.

It is a tricky thing because if you *know* all the cookies are burnt, why would you say that only *some* are? Seems misleading. And yet, feel the room it leaves you. You could say all, but if you say some instead, when you suspect it's all, you allow yourself room to be wrong without having to revise your proposition.

Benjamin Franklin recommended that the more certain you are of something, the less eager you should be to state it universally. If you know all the cookies are burnt, you can hold the tray before everyone and say "some of the cookies are burnt." The effect may be comical, or just good-natured understatement, but there are many reasons one might phrase one's assertion this way even where it is obvious that a stronger assertion would be allowable. If you are sure about your assertion, the group's judgment will come around to your view without need of strong (universal) assertion.

As strange as it may seem, it works the same way with the negative propositions. If you imagine and evaluate that "No cookie on the tray is burnt" (the E-proposition), then (trivially) some are not burnt. But who cares? It's obvious. And you might benefit from saying it instead as an O-proposition, even if you are sure about the E-version of the same. If you are sure of the E-version, assert the O-version and the collective opinion will come your way, and everyone is pleasantly surprised when none of the cookies is burnt. You have a gift for understatement.

My spouse is actually baking cookies as I write these chapters, you may be curious to know, and none is burnt. Yet.

So the rule for super-alternation is that when a universal proposition is treated as true, its corresponding existential proposition is also true, automatically.

But what about when a universal proposition is imagined and evaluated as *false*? If it is not the case that "all of these cookies are burnt," still, *some* of them might be. It's a little harder to think about with the E-proposition. So I say to you "No cookie on this tray is burnt," and you imagine that's wrong, that I said something false. You actually don't have enough information, based on that conviction, to imagine and evaluate whether it is true or false that "some of the cookies are not burnt."

But when a universal proposition is false, we don't have enough information to determine whether its corresponding existential proposition is true or false. I know you are scratching your head about this. Everybody does when they



encounter it for the first time. We could have a long talk about it. *Why* do we have enough information to decide on the “some” propositions when we think of the “all/no” propositions as being true, but we *don't* have enough information to decide about the “some” when we think of the “all/no” propositions as false?

Trust me, this is how it is, but you are wondering about a legitimate question that is hard to understand. I can promise you we will make some progress on this before the book is finished, but we won't answer the question fully. For that you'll need a more advanced class in what is called “the philosophy of logic.”

But that rule and that question has an interesting consequence for our thinking. When you suppose you might be wrong about some fact in the world, you will want to avoid universal quantifiers, but even when you are certain of the fact, it is still usually better to formulate your reference with an existential quantifier, in your thinking. You will see why in the next section.

This is a good opportunity to draw the square of opposition yourself, on a separate sheet, and move your finger along with the descriptions.

Sub-alternation

This one is even harder to think through. It will lead us into some murky waters. It is easy to know when an existential proposition (an I or an O) is true, but it is hard to know when an existential proposition is “false” in the real world. I have been using the word “untrue” to avoid using the word “false” because, as I said much earlier, “false” and “true” are very different animals.

Super-alternation, as we learned above is a gentle kind of test. When your A-proposition is false, your corresponding I-proposition might still be true. Just because we know that it's wrong to say “all the cookies are burnt” doesn't mean that we know whether *some* of them are burnt. We didn't have enough information. But when we *know* it is *untrue* (false) that *some* are burnt, we *don't have to suppose* that all of them are just fine (unburnt). So, when you know an I-proposition is false, you don't know automatically that the A-proposition above it is false but you know *something* about that A-proposition; it isn't a total blank.

But what sort of inference is that? Check your gut. It feels like a leap to say “well, I know it's wrong when I say *some* s are p, so I guess it's also wrong to say *all* s are p.” Can't do it. It feels like going off into territory we haven't really investigated. We weren't talking about *all* the cookies, we were talking about some of them. And I was thinking about *some* of them, and then someone said that group was burnt, and then I imagined that person was wrong, but now someone *else* wants to ask me about *all* the cookies again, and I hadn't thought about “all” of them, only the “some” that were under consideration. I don't know what to say.

The real problem comes in *knowing* whether it is ever really wrong, in any



instance, to say “some *s* is *p*.” To say that requires a very thorough investigation. The philosopher David Hume (1711-1776) once gave the example of black crows. We could go through counting a thousand crows and each one black. We become tempted to say “all crows are black,” when all we really know is that the thousand we looked at were. That is only *some* of the crows. He called this “the problem of induction.” It has a cousin in “the problem of concomitant variation” that we will get to eventually, but I bring it up here so you can watch for it later.

We could weasel out of our problem of induction by saying “Crows are black,” which is an indesignate (unquantified) way of saying it, and we know that our companions will imagine “all crows are black,” if we say “crows are black.” But since we have haven’t explicitly said that, we can fall back on “crows in general, I didn’t mean every single one.” There is sometimes an advantage to being vague and letting people imagine universal quantifiers that you haven’t actually committed to, but that will come up further down the line for persuasion students. From the standpoint of logic, no such vagueness is allowed.

What does it take to *know* that “it is false that: some crows are black”? You would have to know about every crow. And not just the ones alive now, but all that have ever lived and all that ever will. So perhaps you are beginning to see why it’s to your advantage to argue using the existential quantifier? Anyone who says “you are wrong” has to claim to know everything for all time. You can win that argument. If you say “some crows are black” and someone else disagrees, their best (and only viable) strategy is to say “some crows are not black,” at which point you could say “show me one,” if you are feeling aggressive, or “maybe so, but that wasn’t my point” if you are feeling charitable.

But if you use an expansion, like we learned in the last few chapters, you could make a decision about sub-alternation. The cookies are food-on-the-pan, remember? It is a finite group and we can enumerate. In that case, then, saying it is false that “some are burnt” does mean that the contradictory, “No cookie is burnt” is also true. Look at the friendly square.

So what we have learned is that when “some” belongs to a well-defined class (enumerable), we can imagine it false by imagining simultaneously that the E-proposition that contradicts it is true. And since the A-proposition cannot also be true (rule of contraries), the A-proposition “all the cookies are burnt” must be false too. **You can only do this when the subject class of your I-proposition is limited by some sort of context and that fact is made explicit in an expansion that permits enumeration.** Another way of saying this is that you are working with *references*, which includes context (connotation), and that is important.

I am sorry to say that, although the rules are the same, this kind of thinking, sub-alternation, is even more complicated if you start with an O-proposition and then imagine and evaluate it as false.

What does it even *mean* to say “it is false that some of these cookies are not burnt”?



Who talks that way?

Well, it's an interesting way to think, even if it's a confusing way to talk. If the cookies are limited by the food-on-the-pan, it means that the contradictory has to be true, the A-proposition, that all the cookies are burnt. Look at the friendly square. From there, since the E-proposition cannot be simultaneously true, it must be false that "No cookie (that is food on this pan) is burnt." Whoa. That's a pretty amazing thing to know, because it's the same as saying "it's impossible that there is a burnt cookie here on this tray." And you got that by knowing the O-was false. But without limiting the context (working with references in our thinking) we never really know things like this about the world.

Consider: "it is false that: some crows are not black." It means that "all crows are black" only if we have all the crows that ever lived and ever will live. So you never know that an O-proposition is false unless you introduce a limit through a context and a sense of "is." Same with an I-proposition. That is difficult to process, I know. Why would bringing in a limit allow you to know something when it can't be known without that?

There are several reasons that your thinking resists this kind of inference. First, as we learned with serial predication, negation halts thinking and throws our minds into "reflective mode." When there is a negation, we consider all our thinking as a whole, all at once. When you think about an affirmative proposition (an A or an I), you can just keep adding to it, but when you think about a negative one, you brought in a limit. And you came to the point of thinking your full thought all at once.

The friendly square enables you to generalize all your thinking in light of the limits you *might* bring in at any step. For every A-proposition you imagine, there lurks an E- and an O- with the same terms that, sort of, get dragged along. And there is also an I-proposition that only partly agrees. All that baggage is already there when you thought "all the cookies are burnt."

If you add "all burnt cookies are inedible," you added another E- and another O- to your thinking as limits, and another I- that partially agrees. This caravan of propositions is implicit in your thinking process.

You have become aware of this in some situations in your life, but you have probably never had the whole shebang set out before you. I am thinking an A-, and oh, there's the E-version, the O-version, and the I-version sitting right beside it. The same thing happens when you are thinking in I-propositions, except it's even more squirrely, because "some s is p" is not a very strong statement. Some cookies are burnt, some burnt things are inedible, and we don't know anything further about whether we can eat anything on this pan. Maybe so, maybe not.

That square? Well, it sits there saying to you: "so, buddy, you're thinking an I-proposition, so let me tell you a thing or two: If you're thinking about it as being



true, you don't know anything about the A, you don't know anything about the O, but the E is definitely false." So you don't know very much. Yet maybe you could think a little further: "Mr. Square, what if I think about my I-proposition as false?"

Mr. Square: "I gotta tell ya, if you're wrong, and your favorite little I-proposition is *false*, you don't know anything at all unless you've got a clear context, enumeration, the whole deal. But if you have that, then you know the O- is true, the E- is true, and the A- is false." So with the help of the friendly square, you know the status of every proposition you were dragging along.

It's weird that you know more about your thinking when you suppose you are wrong, but that's how it is—at least when you have clarified the context and named the beast. You will always think more clearly when you have taken a step back from what you believe is true and consider the possibility that you are wrong. Further, if you can't do this, anyone else who *can* do it has a huge advantage over you. And lots of people can do it. You can learn it with the help of your friend, Mr. Square.

Things get even more interesting and powerful for you when you learn to think in O-propositions, and to suppose them to be false. Because then, if the context is clear and limited, you know the I-proposition is true by sub-contrariety, the A-proposition is true by contradiction, and the E-proposition is false by contrariety with the A- and contradiction with the I-proposition. This gives you many options for making arguments.

Therefore, we press forward by generalizing in reflection. That is how someone came up with the Mr. Square. Someone recognized that all the moves we make in our thinking, when it is clear, can be generalized and schematized this way. When we reflect and generalize, we switch into the "mode of possibility" and say "suppose for a moment that what I am thinking *might be wrong*." What then? Well, me and my friend Mr. Square have to lay out the possibilities and herd them into some sort of order. This is not a task of active thinking, but an arrangement of possible thoughts into various categories. That is what reflection is. You do it all the time. The only question is when will you learn to do it *well*.

Dead Man's Hand

Let's make a start on that promise about what O-propositions can do to change *your* life. Here is the assertion "some crows are not black." I try to think about it and albino crows begin leaping into my imagination, not because I have ever seen or heard of such a thing, but because I know albino versions of other species exist, so why not crows? I did what every citizen of the 21st century does. Here you go:





It is interesting that red crows and blue crows do not come to mind, even though I have seen plenty of cardinals and blue jays. When I am thinking about black as a color, and reflect on “not black” at the lowest level of generality, “white” is what comes to my imagination, at which point I think, “hey, a white crow; that’s not black, hence, some crows are not black is *true*.” That is how thinking can jump the tracks. Do you see what you did? (Well, I did it, but you probably would too.)

The task was not to determine whether it is true that “some crows are not black.” The task was to think about what it means to *suppose* (imagine and evaluate) “it is false that: some crows are not black.” Now unless you are a very careful and patient person, you are deeply confused. It is part of my job to confuse you, but also to help you clear it up. It is acceptable at this point to be confused, but this is the very barrier you will have to break through in order to master either logic or persuasion.

I have told you that the O-proposition is the key to everything you can really *do*, both in logic and persuasion. You’ll need Mr. Square, even after you’ve practiced. I am going to have to insist that you stay with this point until you really see it.

I repeat: what does it *mean* to say “it is false that: some *s* is not *p*”? The second thing that your thinking has stumbled over, apart from the way that serial predication stops and throws us into reflection when we encounter a negation, is that, if this were a boxing match, you have encountered the devastating uppercut, the negation of all negations: “it is false that . . .” and then you finished it off with a right hook: “some *s* is not *p*.” These are fighting words in any bar. It is the equivalent of calling the other person a liar, to say this to someone. Let me see if I can conjure a context where the severity of this statement comes through.

You are playing poker in a bar in the Old West. Someone across the table says “real poker players deal from the top of the deck,” with the clear implication of the universal quantifier. You look around and say, “you know, mister, it is wrong to say some poker players don’t.” You just accused someone at the table of cheating. If your poker buddy takes your meaning, he might answer “do you have someone in mind?” Now you either have to point out someone at the table, or say “do you?” or back down.

This is highly indirect speech, but the logic is clear and the indirectness is the beauty of it. It sounds like something from a Quentin Tarantino movie, I know. He loves this kind of stuff. To make yourself understood while delivering your line, you will have to phrase it very carefully: “you know, [pause] mister, [pause] it is wrong to say *some* poker players [pause] *don’t*.”

I know that the thought is twisted, but at some level, you do *get it*, especially when the original speaker (who gets it) answers “do you have someone in mind?” *I need you to go with that feeling of understanding this*. What you do when you say that an O-proposition is false is this: you negate at a very general level a negation that was already weird –the negation of the predicate considered *apart from the subject*.



It is the negation of a context, of a field of connotation, and you just negated that negation when you said “it is false that:” and followed with an O-proposition.

You were agreeing with the guy who asserted the A-proposition, but the reason you are the accuser is that you negated the universal context and brought things into the present moment and the present company. The A-guy didn’t do that (at least not with his words alone –if his tone of voice was accusatory and he was looking right at the person dealing, he might have been interpreted as accusing the dealer, but he hasn’t done that, with his words). You *did*.

In logical terms, the negation of the negation of the universal context of the A-guy has caught the subject term “real poker players” (and hence, the denotation) in a sort of limbo. We know where you stand on the negation of the predicate term. You don’t agree. That’s why you brought things into the present, limited context. The players at the table are now your only denotation. But what about the subject term? That is why the right question is “do you have anyone in mind?” “Real poker players” now means “people at this table,” and the A-guy has accepted your imposing the limited context, provisionally, if you are willing to name someone, that is, to give a counter-example to what he asserted: that real poker players deal from the top.

Now consider your possible responses. If that other person, the one you had in mind, is quicker on the draw than you are, you might say, “oh, no one in particular,” suggesting that the denotation is also general and not determined by the context of our present game. There will be grumbling, but maybe no gunplay. Or if you are faster on the draw, you might respond “if the shoe fits.” At that moment you need to be faster than the person you are accusing, and you’d better indicate that person by looking at him when you say “if the shoe fits.” Otherwise, the whole table may draw on you, and surely you’re not that fast.

A tremendous amount of our most important speech and writing proceeds on this principle of considering, in reflection, that an O-proposition might be false. Reflection orders the propositions you drag along in your thinking according to the possibility of their truth and falsity, and then returns to active thinking with careful phrasing. I can also imagine a comical version of this same scene in which no one at the table is smart enough to work out that you made an accusation, except, say, the bartender who laughs out loud but then shuts up and says nothing when everyone glowers in that direction.

Literal-minded people struggle with this movement of both thinking and assertion –it involves multiple substitutions– but nearly everyone who comes to have a command of indirect assertion also comes to have facility with this intriguing relation. Literal-minded people say “All s is p” and “No s is p.” Persuasive and logical people who recognize their own fallibility think “it might be false that: some s is not p.” And only when they are confident do they assert anything. Because it has been said as a false O-proposition and not as a true A proposition,

the possibility remains that it can be interpreted broadly (no one at this table, but surely elsewhere and elsewhere), or particularly: someone here and now. There is a lot of room for interpretation, and yet, the assertion is crystal clear.

That room for our thinking to move about, from particular to general, is the real magic of sub-alternation. Start with I's and O's, reflect on (that is "suppose" — imagine and evaluate) whether they might be true or false, and the room for *formally defensible thinking and assertion* has been opened like a beautiful landscape before you. This is power, of both thought and language, pure and simple. And without this there is only mechanism, repetition, and weakness. Your creativity lies in the domain of sub-alternation and sub-contrariety.

So, the rule for sub-alternation is this: **when the I-proposition is evaluated as false, its corresponding A- must be false (where the context is limited). The same holds for the relation of O- and the E-.** But when the I-proposition is evaluated as true, we don't know about the corresponding A. The same holds for the relationship between the O- and the E-. The true O-proposition tells us nothing about whether the E-proposition, with the same subject and predicate, is true. The A's and I's might be true, and they might be untrue. It's an open question, and not a question we can easily resolve, thanks to Hume's problem of induction. Think albino crows and every crow that ever lived or ever will.

There are very fancy theoretical names for the things you have learned in this chapter so far, but you'll need an upper level course to learn those and impress people you really shouldn't care to impress.

Falsification

We have come around to the promised discussion of falsification. Remember that it's weird to know more when you suppose you're wrong than when you simply believe you're right? This is not about which cookies are burnt anymore. Earlier in the book I said that what is evaluated false in reflection is as false as false gets. The reason is that reflection deals not just with actual cases but with possibility.

Mr. Square helps you contrast what is possible in principle with what is under discussion presently —for instance, the vague and more specific senses of "real poker players." When something cannot even possibly be true, even in some world other than our own (perhaps), it is really, really false. But is anything so very false as that? Actually yes. It is false in fact that Julius Caesar is my biological father. But is that *impossible*? Many of you will want to say "yes." But you are thinking about actualities, what is actually impossible, given the limits we assume implicitly for our discussion. That is not the task any more.

The task is to arrange our ideas in our reflective thinking and ask whether Julius Caesar's being my biological father involves a contradiction in the *form* of the



proposition. Let us formalize and expand:

All persons who is [the] Julius Caesar is_s the person who is the father of [the] author of this book.

This is an A-proposition. It's full contradiction is an O-proposition.

Some person(s) who is [the] Julius Caesar is_s not the person who is the biological father of the author of this book.

You will want to say the O is obviously true. But that is an evaluation of the designated referent (real world) in both the subject and the predicate. When you start with an O-proposition, that real world isn't automatically in play. The O-proposition separates the subject from the predicate and negates *only* the predicate, leaving the subject and the denotative function hanging. You do not *have* to interpret it as singular or even particular, in the second proposition, even if it is singular in the A-proposition.

I doubt seriously that I am descended from Julius Caesar, although I am enjoying thinking about it. Yes, it contradicts the A version: it is surely untrue that the singular person who is Julius Caesar is my biological father. But to say it is *false* requires more. The O form of the proposition is open to more than singular and particular interpretation. I could mean he is my biological father *in general* (removed by 35 generations or so), or that he is the "father" of all true leaders, or that he is the "father" of the Roman Empire, under which my ancestors lived, and so on.

Is that *impossible*? Don't be too quick to say it's impossible, unless you know everything. I don't know myself whether something here might be part of the real world. I can't Google this one. But I do know that to *falsify* an O-proposition, where context is left implicit, requires god-like knowledge. You have to know not only what is the case, past, present, and future, but what could have been or might be.

When you think about your argument beginning with an O-proposition and then introduce considerations as to how it *might be* false, you are on your way to making the strongest case that can be made for the credibility of your proposition. This holds regardless of whether your aim is to persuade an audience or convince a philosophical skeptic.

People are hard to persuade, but it can be done. They may do what your assertion recommends. But they are almost impossible to convince *unless* what you are saying agrees with what they already believe. The one shot you have at moving someone is to drive a wedge somewhere in the level of generality at which they hold a belief, and to move them either toward something more general or something more particular. With that movement, primed in their thought, you can enter your chosen premises. But your thinking must precede your assertions.



Back to the Magic Box

The square of opposition will show you how to understand what you have interpreted to be the assertion of another, assuming you have properly broken it down into a proposition, expanded it correctly (with a generalization), and come to a charitable reference (a beast you named). When you quantify it in the four ways it can be quantified, and then look at the square, you will understand how that proposition stands relative to the other quantities and qualities it might take on. When you spread all four of those forms out on the square, you will see what options you have for disagreeing. Do you take the contrary position? Rarely. Do you particularize (from A-to-I or from E-to-O) and consider the sub-contrary? That is a good idea. Do you then consider the sub-alternation? Now you are really thinking, using your reflective powers to guide your active thinking.

Whether you understand it at this point or not, you have just been handed the keys to the kingdom of power, persuasion, and logical reason. When you have the tools that allow you to employ your reflective powers as guides to your active thinking, you have power over yourself. Without this ability, you are at the mercy of your active thinking, and it will muddle along, making hundreds of avoidable mistakes every day, and it will leave you depending on people who are smarter than you to correct those mistakes. That square of opposition holds most of the possibilities you will ever need to think through any problem you will ever face, at least so far as that problem can be formulated in language.

The bad news is that many problems will not yield to the form of a proposition or even a declarative sentence. Many of your deepest worries will not come to language at all. It is a great struggle, for example when a person is grieving, to bring sensible and clear and appropriate feelings to the clarity of a declarative sentence, or a question, or a command. But when we struggle with such complexes of feeling and try to find the words, sometimes they arrive as gifts from the muses, sometimes as slips of the tongue, sometimes as perfect ironies.

I am old enough to remember the speech in which Richard Nixon came on national television and uttered the words "I am not a crook." A older colleague later pointed out to me that for him, at that moment, the clouds of the Watergate scandal parted and he, and many, many people realized "that's it! He's a crook!" That is the way things rise to language; it is always fair to watch for the first moment of clarity to appear in an irony, in that moment when we creatively reflect on the possibilities surrounding what was just asserted.



EXERCISES:

These are difficult. You might want to do this more than once. You cannot move forward until you can do this.

1. Take the four propositions you came out with in #5 of the exercises for the last chapter and place them on the square of opposition. Write them out.
2. In your thinking, compare your considerations and thoughts from #5 to what you now know about the relations among these propositions. In a sentence or two, refine or correct your earlier observations.
3. Take the A- and E-versions of your proposition and, in a sentence or two, explain why they can't be true at the same time, but both might be untrue.
4. Take the A- and the I-versions of your proposition and explain what happens to the I- if the A is true. Write it out. Then explain what happens to the O- if the E is true. How does super-alternation affect your understanding of this proposition and its possibilities? Give a sentence or two.
5. Take the I- and the O- versions of your proposition and, in a sentence or two, explain how they might both be true, but they cannot both be untrue.
6. Take the O-version of your proposition and, in your thinking, consider the possibility it is false. Construct an example showing how the assertion that it *is* false opens up the possibility of more general or more particular responses to the question your proposition may provoke. In other words, give an example like the poker example. Describe the situation and how the assertion can make it clear. This will take at least a paragraph, maybe two.

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seem that way" (notice my I-proposition and my O-proposition?).

I would point out that if the determinists are right, "it has to be false that: some events are not determined." That is the contradiction of the A-proposition. I don't know how you would prove a statement like that. Do they have some individual events in mind? I think I can play poker with these guys. It's not a wise investment of time to argue with people who think they know everything. They won't convince anyone who doesn't already agree with them, and they sacrifice every advantage they might have in persuading people too. They might be right, but if they are, I don't see how they can claim to know it (there is no contrast to what they claim to know).

So let's agree to liberate the word "determine" from the clutches of know-it-all determinists. Now, in their thinking as in yours, some stuff is vague. It is grouped together vaguely and still has a lot of room for variation. Up to now, we have concentrated on how subject terms and predicate terms converge, with the help of "is," on certain references. But "terms" in logic and persuasion have a more basic function than we have so far described.

Visible Terms

Susanne Langer (1895-1985) was a wonderful philosopher who pointed out that **"relations" make terms "visible."** She didn't mean visible *to our eyes*, primarily, she meant visible *to our minds*. When we "see" elements (when we think about them), we have already been drawn to *relate* them, and when we do that, we have "terms." If I say "peas" and then I say "carrots," you not only think "peas and carrots," you think "veggies!" (If you don't like peas and carrots, think of a pair you do like.) Or I might say "New York" and then say "LA" and you think "coast-to-coast." I suppose I could say "Kanye" and "Taylor" and maybe you think "interruptions," but that is sinking into ancient history. For any two given elements (for the present, "elements" are just terms thought of apart from their proposition) that we might think about there are infinitely many ways they can be related. Some are less obvious, some more so. For example, take these two images.³





What relation(s) do you think might hold between these two persons? Treat each image as if it were a “term” in a formal proposition. When I have asked this question to students, some said “brother and sister,” others “mother and son.” One guy said “stalker and victim.” These are possibilities. How about “cabdriver and passenger”? How about “crew members of a space shuttle”? How about “victims of a terrorist bombing”? Maybe not even the same bombing?

Serial Thinking: Off the Rails

As you see, the possibilities do not quickly become narrow. A fairer observation would be “Dude, what’s your purpose here?” What do I *want* you to see, to guess, to imagine? More guidance would be appreciated, I’m sure. But before I tell you something further about these people, I want you to consider these videos.



<https://url.rylanbooks.com/95tA0>

Some of you may remember this ad campaign, but whether you do or not, you will recognize that these commercials are based on *serial predications*. But notice how the predications begin sensibly enough, and then they float off in increasingly improbable directions. Each string ends with a negation of the final subject-predicate pairing. “Don’t re-enact scenes from *Platoon* with Charlie Sheen . . .”

As we have said, a negation brings the whole series to an end and into reflective co-existence with the beginning and all the steps. As we proceed in the series, we have the beginning stored up and stuffed into the ending as a sort of dynamic tension that presses for expression as the series builds. These ads press that tension about as far as it can go while remaining in our active thinking (that is, without being committed to memory, which is a different act and effort). It’s like memorizing a phone number for just long enough to dial it, except this is easier because these commercials tell a story, sort of, and stories are easier to remember than sequences of numbers.

What is the difference between these silly series in these ads, on one side, and the sort of serial predications we have been examining –boring strings that add on much more probable predicates? We never were *forced* to do what was probable or sensible in making a serial predication. Your thinking can fly off in any direction at all, as you well know. Normally when we trace the paths that our thinking follows, we can see the “train” of our thinking. It is usually sensible. Not always. I don’t know about you, but sometimes I find my mind wandering to heaven knows where, and frankly even these TV commercials make more sense than the eddies and pools of my occasional currents of thought. I’ll bet you are the same. So, what’s up with this?



Let's take just one of the series, the Charlie Sheen commercial:

Key

Terms:

Y = You not recording your shows (S1)

U = Unhappy, feeling (P1)

H = Happy Hour, going to (P2)

A = Anything, up for (P3)

T = Turkish Bath, going to (P4)

C = Charlie Sheen, meeting (P5)

P = Scenes from Platoon, re-enacting (P6)

Relations

f = to feel

g = to go

u = to be up for

m = to meet

r = to re-enact

Now we say:

7. ~rP
6. C r P
5. T m C
4. A g T
3. H u A
2. U g H
1. Y f U



Oh Heavens, Symbols!

We have adopted a little schema and key here that should be obvious enough. We do that to keep from writing the whole series, and because we *can*. The power of symbolizing should be used freely and often. We see here how each of the verbs (which could be treated as some form of “is” but we need not do that here) makes the pair of terms “visible” (understandable) in some way. We are not attempting to remain constant here in the use of “is” because the relations expressed by these verbs are quite specific, and the writers have deliberately *not* kept the senses of “is” uniform. The “is’s” wander. They are being silly, so you’ll notice and remember what they said. Humor can be good for that.

With each move in the progression we are left wondering why the predicate term is so very specific. When one is unhappy, one might do many other things than go to happy hour, and the odds of running into Charlie Sheen at the Turkish bath seem quite remote. And even if you did see him there, why would he come home with you as opposed to the other people at the bath? But I am ruining the humor, no? The randomness and improbability, treated as if it were an inevitable and determinate outcome, well, that is what makes it so much fun. It isn’t so different from Paul Simon’s zoo song. Humans *like* this sort of thing. The randomized specificity for comical purposes.

So what *keeps* our active thinking “on the rails”? First off, nothing. Or at least nothing I know about. Our thinking doesn’t have to stay on any rails and sometimes we are better off when it doesn’t. Our creativity in thinking often depends on thinking outside the box (yes, Mr. Square) or off the rails. But being able to think *within* that box is a great part of knowing what to do *with* the seemingly random stuff that comes from outside and off.

Rules for Rails

The trick is balance. Get a command of what’s *in* the box and then it will be clearer what to do with the unearned moment of inspiration. There actually are some rules that govern a serial predication and keep it on the rails. They are useful when you want to make an argument, a case for some proposition. That is what the ads for Direct TV are doing, but their argument isn’t intended to be persuasive by means of the argument *itself*. It is persuasive because most of us identify with the first premise of each commercial. From there, it’s entertainment. But: Assume for a moment you *do* want to frame a case. **Here are the rules:**

Rules for making arguments with serial predications

1. The Minor premise (Subject 1 + Predicate 1) must be affirmative.
2. A negative premise stops the predication series.



3. It must be possible to make the subject term *determinate as to quantity* (this is called “distribution,” more of which later).
4. The Major premise (the premise which will supply the predicate of the conclusion) can be either affirmative or negative in quality, but it must be universally quantified (all or no/none)
5. The conclusion must have the same quality as the major premise.
6. The conclusion must have no greater quantity than the minor premise.
7. The sense of “is” must be the same throughout (that can be very general, if need be).

This seventh point isn’t exactly the same as finding one of Aristotle’s categories and keeping it, but it is close to the same. It doesn’t have to be rigid, but the rails and boxes are pretty confining. If you are arguing about how something “feels,” you should stay close to that relation. You might use the word “feels” as the relation and also (for example) “seems” so long as the purpose is served. If you are talking about what should be done, stay close to that meaning (is₉ or is₁₀). If you are talking about how something is defined, stay close to that, and so on. This is ballpark stuff.

For instance, I might say “it feels like you are insulting me.” And then I might say “insulting me seems inappropriate.” In this case, “feels” and “seems” are close enough in meaning (given the obvious purpose of saying this, making an objection to your words) that no serious leap has been made, but we have to grant that “feels” makes the subject and predicate “visible” in a way that’s different from “seems” in the second pairing. It is very easy to slide into a bad argument when the word for “is” is different in the two propositions. And yet, much good work, in both logic and persuasion, can be accomplished by inviting the hearer to consider the predicates in closely related but slightly different ways.

Conception and Concept

What we have come to is the difference between a *conception* of something and a *concept* of it. A conception is vague, an unformed image, a constellation of vague ideas about something. A concept is determinate, well-defined, and distinguished from other similar things. I now return to the pair of people whose pictures we saw earlier. Those two people are related in many ways, but one of the most important is this ⁱⁱ:



<https://url.rylanbooks.com/WUXF5>

The two were married. It's Paul and Linda McCartney, a celebrity couple from the last generation, or the one before that, depending on your age. Here they are on their wedding day, with her daughter (from a previous marriage) and a preacher who looks like he has indigestion. They were in the same rock band (called Wings). They were parents of two children together, and they had many other relations apart from being married. But some images make certain relations more obvious, and conceal others. This image doesn't automatically mean they are married, of course. Maybe they just went to church. Maybe they're out for a stroll and encountered a priest. As with all relations, there is a lot of space to consider it.

Conceptions of a Wedding

A further example: When you think about "a wedding," what comes to your mind? You probably have a picture like this:



<https://en.wikipedia.org/wiki/Wedding>

But how far can your *conception* of a wedding be stretched? Can it include this:



<https://url.ryanbooks.com/CPMss>

Your *conception* of a wedding will surely allow this. I mean, why not? But this image teaches us a great deal. It means the church isn't necessary, or the congregation. We could take away the book (Bible? Maybe worship book?) too, since the person officiating might well memorize his part to avoid the chance of dropping the book. What, then, absolutely *must* be included in order for the event to be a wedding? Now (and only now) have we come to the problem of forming a *concept*.

You Have No Concept

The philosopher Alfred North Whitehead (1861-1947) called the "concept" a "reversion of thinking." That was a clever observation on his part. Active thinking is a sort of flow of ideas and images and bits of language through our minds. Think of that like a stampede of animals through a valley. Having a conception of something is like noticing associated aspects of the herd as it passes. "Oh look, there's a bunch of monkeys and meerkats frolicking over there. I'll call them 'a wedding.' Yeah, that company all belong together, more or less, and it's jolly hockey sticks and all, so you can *call* it something."

The word "wedding" for a vague grouping of monkeys and meerkats is an odd way to label it, but then, collective nouns are often weird: a murder of crows, a pride of lions, an indictment of lawyers, a wedding *party* (of monkeys and meerkats). Go ahead, have fun with it. What would you call a group of musicians? A "band"? Why? Make up your own collective noun. A "noise" of musicians. When we do this sort of naming, we are providing the basis for a "concept."

What a *concept* does is to throw a lariat around a small herd of those varied animals and pulls tight. "Hold on there!" is what it says. So instead of rushing by, this combination stays still and undergoes some scrutiny. So, a concept *reverses* the normal flow of thought and encircles it and bids it "stay still" for a while. Now,



staying still is pretty much the *opposite* of thinking (which is a ceaseless flow), and it costs us great effort to turn an image or idea (which passes), or even a thought (which sums up a course of thinking, as with those silly commercials) into a *concept* (which endures). To give you an example of a concept, how about “cat.”

Our references up to now have been proto-concepts. They are thoughts (or “thinkings”) that we name, the outcome of a series of judgments we make – interpretive, reflective, succeeding/failing, and true/false). The references are also a convergence of the denotation, connotation, and sense of “is” *on* that reference, and this is a case of “mutual determination.” The reference, the beast we name, helps us see what we were thinking about, and the thinking helps us find the reference and name it. That is *almost* enough to make references into concepts. Not quite. That’s why they are so hard to name.

Concepts are more durable than these references we have brought together through our effort of thinking. Concepts harden into repeatable thoughts that save us the effort of *forming* them once we have them thoroughly before our mind. The first person who ever thought up “cat” must have been working pretty hard, but what a useful concept! Good name for it too, don’t you think? Somehow cats do just seem like the name “cat,” and I can’t say why. The person who came up with “lipids” got it right too, and the person who came up with “scum.” The person who gave us the name of the concept “dog” could have done better in naming it, in my opinion. The word for “dog” is very different in other languages than English, but “cat” is almost the same in all of them, so it seems. But apart from the name, the *concept* “dog” is a great invention.

Stepping Stones

Concepts become pieces of past thought that we use to bring our reflection into active thinking, without having to repeat the work we did to form them. When you were a kid, you had to do the work of forming concepts yourself. You had a cat named Fluffy, perhaps, and saw a different cat along the sidewalk, and you pointed and said “Fluffy!” And your parent said “no, that’s another cat. . . . Fluffy is a cat, and that thing over there is also a cat.” It was painful to be corrected, but you learned to generalize. “So, Fluffy isn’t just Fluffy, he’s some mysterious thing called ‘cat’ that he somehow *shares* with that thing over there . . .”

Concepts are, in fact, reflective negations of active thinking. That’s why it’s painful to create them. They arrive in our thinking like rocks sticking above the surface of a river (waiting to puncture the canoes of our thinking). Concepts reside in memory. They sit there. They are inflexible, hardened stepping stones you can use as substitutes for active thinking. You can cross the whole river of thinking on concepts without once dipping your toe into the flow. Many people with hardened opinions only use hardened concepts to form their subjects and predicates. They don’t *think* about them anymore. This is especially true in politics.



When Royce was deciding whether to pound out the quail, he used his memory. His dog will go anywhere, he was thinking. But his dog failed *last month* to penetrate an underbrush as thick as what Royce now sees. The concepts in this procession of thinking are numerous. Anything that is drawn from the past *into* the present and used to understand the present, and which is sufficiently determinate to use as a substitute *for* our present perception (such as “my dog”) is a concept. I have a *conception* of what could count as a dog, but “my dog” is much more determinate than that. It is a thought I have that I use when a singular animal is either in my senses/perception, or when I want to think about that singular beast even when she is not present. That thought is not very flexible. Time and use have hardened it. I know my dog. She doesn’t surprise me often. I can think of her, fully formed, whenever I like.

But the concept is a substitute for the actual dog, isn’t it? And the concept probably contains a lot of stuff it doesn’t absolutely *have* to have. When we think actively, much of what we use comes from memory and is already well-formed, and that includes the extra stuff we don’t really need. When I think about my *conception* of a wedding, I consider all the weddings I have attended (including my own) and those I have read about and have seen depicted, such as these pictures present. That amalgam of stuff all sort of lands on me, and then I might add a few things I haven’t really heard of before. For example, what about this ⁵:



Yes, that’s just a frisbee in flight. But it is also a *relation* between whoever threw it and whoever is supposed to catch it. Can I not imagine a wedding consummated with a frisbee throw instead of a kiss? “You may now toss this to your spouse,” the preacher might say (or the Justice of the Peace, or whoever). Or maybe instead of exchanging rings, one partner tosses the ceremonial frisbee as a symbol of the vow, and the other tosses it back. Fun!

When you begin to read about wedding customs around the world, there is nothing even remotely weird about such a suggestion. Some of our own traditions, well, we don’t even know precisely what they mean, we just do them anyway. The tradition of having the groom crush a glass at the end of a Jewish wedding has many explanations, none of them certain.⁶ It’s just something that some people do as part of a wedding. If you don’t do it, it’s still a wedding. The concept remains



intact, but the glass-crushing is part of the wider conception.

But if we take *my* conception and seek to make it into a tight concept, we have to strip away the particulars of my memory, and yours, and various other peoples and times, and we try to find the *essential core* of the whole conception. What really *must* be there for the event to be a wedding?

A Bit of Violence

We could have a long discussion about this, but I think it boils down to this: two or more people making a commitment and at least one witness. The witness might officiate, but I know of cultures where no one “officiates” but people still get married. What I have a harder time with is a wedding with no witness. I also have difficulty with the idea of people marrying non-people –like the sea: “my bride is the sea,” says the sailor (very poetic, but not a proper wedding); or marrying one’s pet German Shepherd (pretty freaky, but I’m sure it’s been tried); or someone who is dead, in heaven, or not yet born (but be careful here –Mormons marry the dead, using stand-ins, and Roman Catholic nuns are bethrothed to Jesus Christ, who is “alive” for them for sure, to them, but not in quite the same way as you or me – assuming I still am living when you read this; I’m sure about you, though).

I will stick with my three elements (at least two people being married, and at least one witness). Now, what must happen? Vows. There must be vows, or promises, or at least some sort of declaration of the intent to be married. It doesn’t have to be a ritual that others have done before, and it can surely be done by long distance, so physical presence is not absolutely necessary. But take away the vows/declaration, it ain’t a wedding. Anything else? I can’t think of anything. The rest is variable.

What did we do there? We *simplified* a conception into a concept, and in so doing we reduced the elements to just those we absolutely *had to have*. The formation of a clear concept is the work, in our reflection, of removing thoughts from time, history, circumstance, and anything accidental, and boiling the matter down to something I could re-think in any circumstance –and so could you. Part of the purpose of doing the work to form a concept is so that you and I (and everyone else) can *think the same thought*. We are trying to create common elements that we think together and which can be close to “the same” for everyone.

Some people rightly recognize the “violence” in stripping away everything peculiar and particular from someone’s conception. What if I left out something you think is essential? You won’t be well-served by that. The process is indeed “violent” in the sense that we must lose so much of what is valuable in our experience to carry out this task, that it isn’t clear whether the concept that remains is a tool or a weapon. In truth, it can be either, depending on how it is used.

If you want to force your concept of a wedding on someone else, and you have the



power to do it, you might choose to say something like “Marriage = One Man + One Woman.” You might try to pass a law, and even prosecute people who defy it. The fact that all of history says you’re being violent when you force others to think (and act) *your* way might not stop you from doing that. In fact, sometimes all of us try to force our concepts on others.

The Western religions call this sort of unneeded violence “sin” and it’s about the opposite of peace. It is also the opposite of persuasion, in any case. Its logic favors power over interpretation and understanding. And as logic, that is deficient in every way. You cannot possibly be rational while you are forcing others to think as you do. You might be wrong, and you can’t *learn* whether you’re wrong when you are forcing others to think as you do. If your concept is so very clear and so perfectly formed, why doesn’t everyone choose it freely as the best tool? Are they all dense? Or do you still have some reflecting to do? I will leave you to your own conclusion. (This is called an enthymeme; there will be much more on this later.) And I wouldn’t want to force you to think as I do.

Short-cuts

Let us suppose, for a moment, that my concept of a wedding is serviceable. I might be wrong. I have spent a good amount of time working on it, long before this book. I have a few thousand other concepts that I use as substitutes for thinking, at this late date. A great part of our lives, and especially our education, is dedicated to *forming* concepts that we can use as short-cuts later.

But like any short-cut, there is a risk of missing the scenery and failing to notice how things beside the longer road have changed since we did our work of forming a concept. I know a fair number of people who would count my concept of a wedding as too general. They want a preacher and a church and a deity and a piece of legal paper. They want rings and dresses and attendants and flowers and musicians and relatives. I think they need to set aside their old short-cuts and travel the long road again. But maybe they think I’m the devil’s spawn. A number of people think that, even some who agree with me about weddings. (“Devil’s spawn” is an interesting conception, but I admit I have never worked it into a solid concept.)

So, in your memory and reflection, you have many concepts, and just as your active thinking is a substitute for action in the world, your concepts are placeholders for relations you have worked out reflectively between your thinking (and its “thoughts”) and your full share of life experience. Short-cuts. You don’t have time or energy to recreate your thoughts on every occasion, so, just like tying your shoes by habit, you think the thoughts you thought before by invoking concepts. Some of your concepts have excess baggage, but some do not.



Experts

Becoming an expert at anything means achieving a conceptual command, detailed and precise, of whatever field you have chosen to learn. In a service economy like ours in the US, that is what people pay you for. To be an expert. You are supposed to know things in detail, with refined concepts, that other people know only vaguely and in general. If you expect to get your living by some means other than working with your hands (and that is noble and valuable work), then you will have to do some hard work, work others have not done, to master a collection of concepts and to know which ones to use when and how. That will be your career, no matter what direction you go. People with college degrees are paid to master concepts. Consider this:



<https://url.rylanbooks.com/NAxp0>

You may end up working for people whose grasp of concepts is weak. But yours must be strong, and you must show as much flexibility as the expert in this video. The good news is that if you want to coast through your life, you can just learn concepts that other people have worked hard to create and refine. You don't actually have to create any of your own. If you do create some concepts of your own, you may expect resistance from those who prefer their own short-cuts. Be mindful and compassionate. Thinking is hard.

Having a full, detailed, and broad command of a field of concepts, and using them to help and serve people is a perfectly good way to live your life, and you need not feel guilty for not creating new concepts. But be sure you truly learn the ones you are responsible for knowing and using. Otherwise you are *incompetent*, and that is a hell all its own. You might get by with it, you might not. A lot of people do. You won't make many friends by pointing out the incompetent people around you. But if someone is endangered by their incompetence, I hope you'll break silence and deal with the consequences later.

To be fully honest, both persuasion and logical reasoning are arts, with all the human frailty that implies. How good is your art? Your adolescent poetry? These human practices are not primarily skills or techniques, although they require a high degree of skill and the mastery of technique, like any arts do. To be really good at either persuasion or logic, you need the capacity for creativity, and when it comes to concepts, it means doing the hard work, for yourself, of taking your own thoughts, and their amalgam as conceptions in your whole share of experience, and making some concepts of your own.

Whether you have yet realized it, the preceding chapters have taught you to make your own concepts. There is nothing easy about it. Some people find it torturous. But you are in college and you are here because you want more from your life than to answer someone else's phone and take a message. I am going to suggest that it



will be worth your effort to go back through these chapters, now that you know how this part of the story ends, and do what I asked you to do *for real*. Not as an exercise, but for the benefit of your mental self-command.

I slowed you down and showed you what you now do too fast and too sloppily, and I showed you some ways to bring some order to that process. Now I warn you thus: Never, ever, believe that your concepts are adequate, no matter how hard you worked to form them, and no matter how tempting it is to just to call on them as short-cuts.

Re-do the work as often as you can stand it. Make the judgments *again*. Re-engage with the world you think you already know and try to become a more sensitive interpreter of others and of your own experience. Even the Dalai Lama has to keep working at this, so *you* definitely do. Concepts are like our mental progeny. By all means be fruitful and multiply. But don't favor one of your mental children over the others. You'll spoil that child. And both you and the child will suffer.



EXERCISES:

I suppose it goes without saying that this will be difficult.

1. Choose one of the Direct TV ads (not the Charlie Sheen one) and create a Key and express the full thread as a serial predication, just like I did for the Charlie Sheen ad. Write it out.
2. Take the beginning proposition of your chosen serial predication and work it into a *more believable* (and boring) series of at least three predicates, using a consistent sense of “is” (it need not be exactly the same verb, but is should be close enough to stay on the rails, see rule 7). Obviously, you should follow all the rules stated in the chapter. I didn’t put them there for my health. Write out your new series in symbols with a key, like the one I gave for the Charlie Sheen ad.
3. How does the series of relation(s) you chose make its terms “visible”? Write two or three sentences describing the relations. This is hard to do. You will want to know what “how” means in the first sentence above. It means “how does it work in this case?” You will want to know what *that* means. It means “how is your thinking facilitated by just these terms and not some others?” That’s all I can do for you. It’s yours from there.
4. Take the relations you described, all of them altogether, as a conception of some broad field of experience *and name it*. That won’t be easy. Consider the entire video on the expert and think about what he just went through in his meeting. Naming his experience is much like naming the amalgamated relations in your example.
5. Make the conception into a concept by reducing it to only the essential elements that you could re-think, without having to do the work again. Write out these essential elements and relations (there won’t be many –for the wedding there were only two people, a witness, and vows). Name your concept (this should be obvious, so don’t make it too hard).

- i. <https://observer.com/2017/05/paul-mccartney-saved-classic-rock-flowers-in-the-dirt-reissue-review/>
- ii. <http://bicentennial.norwich.edu/26-linda-eastman-vc61-married-paul-mccartney/>
- iii. <https://www.alamy.com/stock-photo-beatles-1969-paul-mccartney-marries-linda-eastman-at-church-with-her-19530870.html>
- iv. <https://sites.google.com/site/coatsgraduation/my-3-favorite-memory-of-hg>
- See <https://www.myjewishlearning.com/article/breaking-the-glass-at-a-jewish-wedding/>



CHAPTER 12

Way back at the beginning of this book I asked you to treat every verb as some version of “is.” That is the easiest way to learn this stuff. After all, every relation does come down to some version of “is” —except “is not” poses special problems, as we have learned. But there is more to “is” than the ten senses we have been using from Aristotle, even if pretty much every “is” comes down to one of those ten. But “is” is a relation, the most general relation that exists (“exists” basically means is_1 by the way).

The great thing about relations is that they have infinitely many shades of difference, so you can say almost anything you want, and even do it in a way that has never quite been said before. It's more than just new combinations of words, there is tone, gesture,

context, mood, inflection, and dozens of other details that clothe a gathering of words with a meaning. The bad thing about relations is that they are so numerous and subtle that it is hard to get a handle on them. What those ten categories from Aristotle *do* is help you organize the relations into some pretty handy groups. It simplifies them. Maybe too much.

Now it's time to move back into the genuine complexity of our thinking process. The word "is" is the *relation of all relations*, but our propositions, so far, have avoided certain kinds of relations. These are relations that orient the word "is" in certain law-like ways, and which push our thinking in a particular direction, and often conjure images in our minds that I didn't want to deal with, until now. We have avoided past and future tense, and also every other shade of tense –pluperfect subjunctive, future perfect, progressive, and so on. These tenses also matter to logic and persuasion, because *anything* that affects meaning also affects logic and persuasion. But we will not tackle tenses in this chapter. Let's keep it in the present for a while longer, and struggle with some images that appear as we ponder the relations embedded in propositions.

Complex Relations

Take this example: "is south of." Notice that the word "is" has now been limited to compass directions in general, or perhaps only to one such direction. When you hear "is south of," maybe you see a map (in your mind's eye), oriented with north to the top, and think about scanning from top to bottom to see what "is south of" what. Or maybe you think of what you see when you look southward from your doorstep. Or maybe you think of some destination out of sight that is south of where you are. You might even think of some project at work that is "going south" (failing).

When we add relations that are quite general, like "is to the left of" or "is older than," and so on, these combinations with "is" make our thinking spring to life. You might be thinking, "what does this have to do with concepts?" We worked very hard to throw a lariat around an essential core of a conception, so that we *made* a concept. That's what we were talking about in the last chapter, right? Cool your jets, we'll get there. For now, notice that our denotation *is* a concept, our connotation *is* a conception, while our copula *is*, a relation. The relation does the real work. The concept sits there all tied up so that it can denote, and the conception moves around it being all vague and fuzzy, contextualizing. They don't notice each other until you offer a relation.



Mr. Square's Little Secret

I want to let you in on a secret about the square of opposition. It is about relations. There are five basic relations that the square captures, and there are several more subtle relations hiding in there too. What are they?

Contrariety = Contrast

Contradictories = Exclusion (of one sort)

Sub-contraries = Comparison

Super-alternation = generalization and specification (within limits)

Sub-alternation = generalization and specification (within difference)

When you were thinking about which propositional forms (A, E, I, O) can be true or false at the same time, you were actually comparing, contrasting, generalizing/specifying (these are types of inclusion), and you were also excluding (in a way). If you go back and look at the square, you'll now see why I said sub-contraries are the best relation for reasoning and thinking. This is comparison –both the I-proposition and the O-proposition can be true, but they can't both be false. That is solid comparison: choose either or both, but you must choose at least one. Audiences respond well to that sort of choosing.

Why is that? Simple. Because any subject-predicate combination has at least *something* in common with anything else you want to compare it to (the "is" insures that much), and after all, the two propositions (the I and O) have the same subject and predicate, but that commonality gets interesting when you negate only the predicate (connotative field, context) for comparison purposes (the O, some *s is not p*), because the subject term (denotation) is still *the same*, in both the I- and the O-proposition.

You shift to a different connotative field, but you're still talking about the *same* subject. Duh. You say "used car salesmen are liars." I interpret you generously as meaning "some are liars" and I say, "but some are honest" (i.e., some are not liars). You allow that is true and say "do you have anyone in mind, I need a used car." It's a real conversation. That is a hard thing to have when you say "all used car salesmen are liars" and I just say "no they aren't." Consider:



<https://url.rylanbooks.com/qTcTl>

It might be challenging to go through this entire video and determine which are contradictions, properly speaking, which are contraries, and there are a couple of sub- and super-alternations in the exchange. What is missing is sub-contraries, which is why the receptionist sends the client to Mr. Barnard and not Mr. Dubakee



(who is a little bit conciliatory, i.e., uses sub-contraries).

There is one more secret hiding in Mr. Square's pocket. The references you have been creating from your "denotations and connotations and is_n" are conceptions, not concepts, taken together, **but you treat them as if they were fully formed concepts when you stuff your first subject into your first predicate, and then take that stuffed result as the denotative part of a further proposition by adding a new predicate.** That secret is the master key to logic. Every important logical relation can be cast as a process of transforming predicates into subjects by stuffing, since you can stuff subjects into predicates in many different ways. You'll see. Call this the "magic of distribution."

A Little Effort Goes a Long Way

You have learned to distill a concept from a broader (and vaguer) conception. You have learned that concepts are handy, congealed pieces of your own past efforts at thinking. You use these concepts as short-cuts, since they save you from repeating the thinking you did before. Now, a new piece of the story: Your concepts can grow and be refined and filled out with your further experience and maturation, *and* with added effort. Your concept of a cat wouldn't grow very much, after you pretty much figured out how to tell a cat from anything that wasn't a cat. But your concept of a wedding might have deepened and become more refined in the last two chapters.

As useful as concepts are, they are also hidden booby-traps. They often blind you to what is *new* in your experience. Most people (especially after they are done with school) don't work on improving their concepts until they *have to*—when they make an error, some assertion fails, some procedure or instruction can't be understood or processed, or an ethical choice arises for which they were unprepared. But this is waiting too late. This is damage control, not free thinking. You have to do better than that, especially if you want successful relationships with people. You need to be willing to drop back from your favored concept into a conception and look for new relations.

Recognize, for instance, what concept you are carrying around, of, say, a "dog." You can sit there with it, sure enough. Would you be willing to modify it without waiting for some error or borderline case to come up? A famous philosopher named John Dewey (1859-1952) called this eagerness for new experience, before it is needed, "imaginative rehearsal." He said it comes in really handy to have done the imaginative work in advance because when the pressure is on, it's hard to think. How do you *do* imaginative rehearsal? Easy: Is a fox a dog? What about a coyote? A jackal? A hyena? A wolf? (Have you ever been near a real wolf? Geez, they are powerful and smart. I do not plan to make one mad at me.)



The point: What makes a dog a dog, among dog-like beings? Think about it *now*. Look it up. What if I bring you a plush toy made to look like a dog? Is that a dog? In what way is it, and in what way isn't it? You can think about it, right now, for free. How about a picture of a dog? Is that a dog? Don't wait for the jackals and foxes and hyenas to show up, or especially wolves. Do you take my meaning here? This is a metaphor for your life. When the *human* jackals and hyenas and wolves show up, it's too late. You'll have to decide whether to say "good dog" and offer a hand or run for your life.

It happens with concepts all the time. Something is in front of you, you don't know what it is, exactly, and you can't afford to guess wrong. You compare it to things it is like, and set them aside one by one, to the extent they are unlike (in contrast), and then maybe your concept grows. Do this *before* the need arises and you're golden.

Rancho Logos

So think of it this way: Your concepts are like horses in a barn, not like marbles in a jar. You don't *own* the barn, and anybody can ride the horses. But you have your own individual history with each horse, and they remember you too. Whatever you've done before when you were riding a concept, it's all still there when you ride it again. You can develop an adversarial relationship with a concept, like injustice, or taxes, or even God. You can be afraid of some concepts, like death, or divorce, or infidelity. You can admire some concepts, like truth, or wealth, or power. You can become obsessed with some. Don't do that. They're just concepts.

Some horses always seem to run together, like truth, justice, and the American way (granted, that last horse has gone missing, and I can't remember where the barn even was anymore). That trio used to be seen charging across the prairie and the range, and people would say, "hey there they go!" Other horses run together too, like greed, corruption, and vice. They run around county courthouses and state houses and even bigger buildings in national capitals. When you ride one of them, the others run alongside (whether you like it or not).

Other concepts are difficult to get into the same barn at all. Justice doesn't like injustice, but sort of needs it. They are frenemies. Truth and falsehood have trouble eating from the same haybale, but they actually have to live in the same stall, not just the same barn. These groupings of concepts are the next topic we have to discuss. It'll be a rodeo – too much all at once, I'm afraid, but a fun show.



The Real Santa Claus

Whatever you think of these concept-horses right now, individually or in herds, they are living things and they have a future as well as a history. When you ride a concept, to get you to your destination faster, it isn't quite the same as it was the last time you rode it, or the time before that. You have changed and so has it, even if you rode that concept yesterday, and even if you ride it every day. The concepts we ride every day are the ones we have the most difficulty in seeing how they change. It's like the aging process of people you see daily. You look at a picture of your family from ten years ago, and you realize, "geez, we are all older." The most important concepts for your life are the very ones you need to see in a broader perspective, over time.

One of the best stories I ever heard was this one somebody told me:

When I was a kid, I believed in Santa Claus, because my parents told me there was a chubby, bearded elf in a red suit who visited all the children in the world at midnight on Christmas Eve. He brought toys if you had been good, coals if you had been bad, and kept a list of everything you did. Then, when I was eight or nine, I came to understand that there was no Santa Claus. It was my parents, and yes, they had a mental list of everything I did, but there were never any coals, just good presents. I was disillusioned. I lost Santa Claus. He doesn't exist. It was just my parents the whole time. He remained non-existent for a long time. Then I had children of my own, and I had to decide whether to tell them there was a chubby elf of that sort. Only then did I begin thinking. Santa Claus doesn't exist, it was just my parents. I was used to thinking that. Then it dawned on me. Santa Claus does exist. It's my parents.

You get ideas like that when you get perspective, and then your concepts change, all the way down sometimes, like this story. Now, I guess you see why truth and falsehood have to live in the same stall. Only the deepest truths can be falsehoods, and vice-versa. A famous philosopher named Reinhold Niebuhr (1892-1971) once said "paradox is the criterion of truth." What he meant is that if the thing you're thinking about doesn't bring you to a barn, and then a stall where truth and falsehood live together, you don't yet have the truth.

Existence and non-existence are similar. And possibility, probability, likelihood, and action all share a stall in the barn of concepts too. Some barns hold the horses of science, some barns have the horses of art, some of history, some of politics, some of economics, and so on. There are horses that look very similar in some of these barns, but trust me, they are different. The Economics Barn may look like the Psychology Barn, and even have some of the same names, these days, but the horses are different—they get different food and different people ride them.



It's a pretty big ranch. Rancho Logos. In English that's The Double R, The Reason Ranch. You'll spend most of your professional life in one barn, probably one part of one barn. Sorry about that. Keep it clean, don't let the horse pellets pile up. Fresh hay, oh, and one other thing you need to do . . .

A Round-up

You notice that some concepts share a barn, share a stall, and have better or worse compatibility, enemies, frenemies, and friends. All of these groups of concepts sort of end up in the corral (outside) at various times, but there is news. When it comes to your thinking, *you* build the corral, and *you* decide which things you will think of as being there together, which horses you will trot out and why, on the right occasions. You inherited the barns and the ranch itself from previous generations, and you got to know the horses one by one. But the corral is your job to build. It's your persona, your public face.

But in terms of maintenance it's your ranch now, and your barns. You'll have to share with others, those who happen to be alive now and, in a different way, those who will come in the future, but you can make some changes. You don't know everything the previous owners knew, but you know some things they never did, because the world has changed. As Walt Whitman said, the powerful play goes on and you may contribute a verse.

Furlongs per Fortnight

They knew what a furlong was, and a fortnight, and a fathom and a league. You probably do not. Those horses have gone to horsey heaven. You know what an emoji is, and a database, and a text message. They did not. The new horses are probably some of your favorites. It's only natural. But each one, old or young, consists of a number of *other* concepts and ideas, smooshed together and running around free. Every foal has a sire and a dam, and each of them had a pair or predecessors as well, a bloodline of conceptions that became determinate concepts. That concept you are riding did not come to be roaming around on its own.

Some concepts come from lines of descent so long that we can't really trace them. Some are recent. You know what a laser beam is, right? But did you know that the word comes from an acronym: Light Amplification by the Stimulated Emission of Radiation. Scuba gear? Self-Contained Underwater Breathing Apparatus. Concepts are made up of other concepts.

Looking for the essential core of a concept is very much like finding its true lineage, but no aunts and uncles, only the contributors without which it *just wouldn't be*



what it is.

No concept is wholly simple, then. All concepts are “unities,” but *complex* unities. Unity does not imply simplicity. Those two don’t share a stall. You are a walking, talking unity called a person, but you are not simple. Where we can agree on lineage, on the essential core, we can be confident we are talking about the same horse. Describing what the horse looks like, or how it behaves, isn’t always very helpful. Many horses behave similarly, and many look very much alike, but no two have exactly the same lineage. Freedom is not quite the same thing as Liberty. To cease is not quite the same thing as to desist. Tuition isn’t the same thing as Fees. It seems that no matter how skinny Tuition gets, Fees still eats very well. You probably learned that fairly recently.

To put this in language philosophers use, concepts have a “genesis” and a “genealogy.” (That is, a sire and a dam, and her foal taken as something stuffed with the whole bloodline.) When you are working with a concept, you are working with its genesis and its genealogy whether you know it or not. All that *this* horse (any horse) is, when you ride it, belongs to its past, but it also has uses in the present and it has a future. So you are riding time itself when you use a concept. It’s a wild ride sometimes. Other times it’s a canter. And sometimes, often really, you and your concept are just grazing.

But then comes time for the round-up. You have to gather the concepts you want into a corral for a purpose. Maybe to sell at market, maybe to brand, maybe to vaccinate, maybe just to admire, or count, appraise, and pay taxes on them. When round-up comes, it’s a lot of work, sorting, examining them one by one, taking notes on their health, considering what they are best suited for in the future. You do this when you decide how to make a presentation, for example. When you form a plan of action, or a flowchart, or just decide which ingredients to include in your supper dish and in what order they should be combined.

Your OK Corral

The corral you build is connected to the barn, a sort of appendage, temporary (compared to the barn), put up for particular purposes. Some corrals are big, some are small. As I said, this corral is called, in logic, a “class.” You can build it (define it) any way you want, but it needs to be sturdy enough to hold the horses you will be working with. Only fully determinate beasts are allowed into the corral, ones with a clear purpose for being there, ones that are not vague connotative clouds, but fully fed and stuffed with their bloodlines --which is not to say you couldn’t have a corral of mythical or fictional horses and reason about them logically, but you must define their essential core. If you don’t know its lineage, its essence, it doesn’t go in the corral. Got it? Of course, you could be mistaken about this or that part of the lineage, but **no conceptions in the corral, only determinate concepts.** If



I find out you have a vaguely horse-like thing in your corral, I am going to report you to your teacher and you'll lose points for keeping a sloppy corral and not knowing your own stock.

You do realize that "horse" is just a metaphor for any and all concepts, right? I'm getting carried away with the analogy, I know. Sorry. It'll get worse though.

The concepts you have rounded up in your class are called "elements." You can name them if you like. Here is an example:

Class = Red, Blue, Green, Indigo, Yellow, Purple

Can you name the corral? I'm betting you can. It's called "The Visible Spectrum." Indigo gave it away, didn't it? Otherwise it looks like the "Basic Colors Corral." Notice that I did not list them in order of their wavelength, although I might have. They can be arranged in different ways for other reasons. What about this one:

Class = G A B C D E F#

Ah, another giveaway for those who know it. It's not just the F# that gives it away, it's the order. This corral is "G Major Scale Ascending." These classes are easy to understand because so many people use them. Not everyone understands them equally well. Physicists who study light and optics understand the first one better, and piano tuners understand the second one even better than even most musicians do.

These corrals are attached to the barns called Music, and Vision, on sections of the Rancho Logos called Sound and Light, and they meet in a big part of the ranch called "Vibrations." Whenever you create a class, it is a small part of a bigger place, going back through the barn and out the barn door onto the ranch itself.

The way you identify your elements is just by listing them and giving their names. Usually these names will have some easy association with the concept itself. So, in the first example I gave above, we might say:

Class = R, B, G, I, Y, P

But if I did that, you would need a key:

R = Red

B = Blue

G = Green

I = Indigo

Y = Yellow



P = Purple

It is easier to work with the single letters than with words, and we have been doing this sort of naming already, right? Just as a matter of common sense, we want to choose names, and then letters or symbols representing the names, that help us remember. I could have done this:

= Red

& = Blue

@ = Green

! = Indigo

% = Yellow

\$ = Purple

But you would have to spend a lot of effort trying to remember the key and only then could you carry out operations with such symbols. Some philosophers, like the weirdly named Quine, have said that the notation system is more important than the rules in logic. I expect this is right.

From Elements to Terms

Susanne Langer (I mentioned her earlier) says that the difference between the elements of a class and the “members” of a “universe of discourse” and the “terms” we use in logical propositions is that **elements, restricted by a formal universe of discourse, become terms when made visible by a relation.** Yes, that’s a lot to take in all at once. Let’s have an example first. Consider this:

Los Angeles is south of San Francisco.

Now, let’s round up some horses. We *could* call this corral “US Cities,” but that is really the *part of the farm*, not quite the barn (which is probably Cities in California). How about this corral: “Major Cities in California.”

Class = LA, SD, SJ, SF

There you have them. These are the four largest cities in California. So here is a kind of corral, a class. Four horses pawing about, elements. Named. What will you do with them? How about: “Los Angeles is older than San Diego.” I don’t even know whether that is factual (it’s actually a complicated question). It doesn’t matter because I understand the relation “older than” and the two elements being used as terms. If it’s functionally true, great, but either way *I asserted it.* **The “older than” relation makes those elements visible to my mind in a certain context.** It succeeds in helping me make a reference-beast. That context is no longer the vague context of a conception, it is now a *formal* context, which is called a “universe of

discourse.”

The word “universe” is a term of restriction, meaning that the only things in our universe for this piece of reasoning are those made visible by the relations *we now specify*. That is how elements become “terms.” The word “discourse” is used to acknowledge that everything here is being *treated* as language of some sort, including gestures, images, and anything else that can be *interpreted*. Gestures and images can *be* just as determinate as names, but we will work with named concepts in logic. We make it into “discourse” (just a fancy word for “abstract language”) in order to define it better and think about it more clearly, even if it isn’t really language at all (maybe a given image is still discourse). Naming is one way of breaking, and taming, and training our concepts. “Lead them ponies onto Rancho Logos, to the right barn, and make a corral for trainin’ ‘em, partner.” So our concepts are more than discourse, but while they are in our universe of discourse, we don’t consider that.

I think about the founding of one city, and then the founding of the other city. I can see:

LA o SD

Now that I’ve added a relation, “o” for “older than” to my UD, I can set up a serial predication:

LA o SD, SD o SF, SF o SJ

Older than. Hmmm. What is that? Probably a version of $is_{>}$, condition, don’t you think? *Now* I can sort of *see* that assertion (if this is borne out by the facts). It’s visible. Due to the relation. But there’s more.

I also know that LA o SF would have to follow, because the relation “older than” is “transitive” (that is the word logicians and mathematicians use for relations: If A is to B as B is to C, then A is to C as B is to C). Some relations are transitive, some are not. Some are commutative (meaning A is to B as B is to A), but “older than” is not one of those. There will be more about this sort of thing later.

Relations can have many different properties, but one that they all have in common is this: **relations transform elements in a class into terms (in propositions) belonging to a universe of discourse.** Name a relation that is even remotely relevant to your elements, running around the corral (such as cities), and the concepts we have used to *make* our elements help us line up those elements according to the chosen relation.



Here is another example:

r = population by greater metropolitan area (call it gmp, for “greater metro population”). Line up the horses. The cities are being conceived as metropolitan areas, and maybe they go:

LA gmp SF, SF gmp SD, SD gmp SJ

I didn’t look it up, so I don’t know if this is an accurate predication, but I do know what it means, and I can *see* that this relation is also transitive and non-commutative. If I have the facts wrong, it would be easy to rearrange the symbols to reflect the actual situation. You look it up. You don’t have much to do. I’m busy. But what if I add a second relation to my UD? How about:

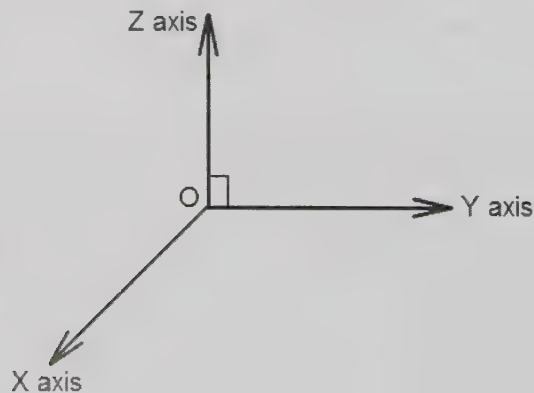
r = population within official city limits (lp)

That could have a huge effect on how I think about these four terms. It may now be that:

SJ lp SD, SD lp LA, LA lp SF

And we learn that the metropolitan area population is *different* from the population within the city limits, both factually and *logically*, and we can make interesting comparisons. The logical differences make factual differences easier to think about. We could bring in population density (pd), land area (la), and just keep adding relations, but each time we add one, we create one more axis along which we must think. After three, or at most four, relations, we begin to be unable to retain all the horses (our terms) in all their relations simultaneously, and the corral develops weak spots. The horses may escape unless we add more supporting structure.

When we have two relations, we can represent them on x and y axes; when we have three, we can add a z axis:





Here we might compare and contrast the land area, average income, and population density within the city limits of Los Angeles as compared to San Francisco (it is very different), by making two figures and comparing them. This is about as complex as most people get in their practical thinking. This kind of schema is well adapted to our powers, because it is in three dimensions, just as is our experience of visual space.

When relations are limited to three, we can usually imagine them in a space we made up. *That* is what you're doing when you built your corral: making up spaces, and they don't have to be based on visible spaces, but that is easiest. Musicians often imagine in "auditory spaces," and architects in kinetic or ergonomic spaces. In all cases, you are imagining elements in small groups, and making them visible as terms by specifying relations. When you choose a relation, the images (almost magically) arrange themselves before your mind's eye. If you choose a purpose and three relations that serve it, you have enough for training these terms for almost whatever you need, relative to that purpose. If your problem is complicated and requires more relations, you will have to compensate by adding formal operations (we will get to this in the next chapter) to keep track of the relations among the relations.

Busting Out, Bucking, and Bolting

If I ask you to *analyze* the population of the four largest cities in California along more than three axes at the same time, then, I am not asking you to think about it or imagine it, I am basically asking for a kind of computer program: recursive operations that compare relations of relations. But that is the magic of doing logic: you can use well defined terms, as made visible by numerous relations, to create outcomes that you really could never think through without a protocol (first this, then that, then the other, and finally something further). Your active thinking begins to bog down after just a few relations are added, and just a few concepts are stuffed. Computers do not bog down as quickly (although they *do* bog down).

When you add relations to your terms, you make them visible, but you also make them mobile, make them run, do work, sweat, play. If you do not keep adequate determinateness in their training along all lines at once, they may bust out, or buck, or bolt, or they may refuse to run at all, even refuse to eat. They can die. The corral system is dynamic, whether it's your actual thinking or a computer processing relations. You can do lots of stuff with these horses, but you have to keep them nourished and happy (determinate, trained, and moving).

Reasoning on the Rancho Logos isn't for lightweights and greenhorns. Relations are magical, when tied to a purpose and when they are being used to transform elements into terms, but it takes practice to get good at doing it.

EXERCISES

1. Welcome to the region of Rancho Logos called Waterways. There is a conceptual barn over there called “Major Rivers.” I want you to go in and bring out, say, four major rivers, and list them as a class of elements.
2. Now, name a relation, any relation that seems like it may be useful, and line up the elements according to that relation. You’ll need to choose some symbols. Use capital letters for your elements and lower-case letters for your relation. Set it all out like it is in the chapter.
3. Choose a purpose for your inquiry, and make a serial predication of three propositions using your terms and your first relation.
4. Keeping your purpose in mind, choose a second relation, and make a second serial predication of three propositions using that new relation and the sequential order it suggests.
5. Rework your terms so that your first relation (and its serialization) is an x-axis, while your second relation (and its serialization) is a y-axis. Draw them and make them meet or cross, as seems appropriate to you. Now think about what this schema may mean, and about how you might describe, or even *name* the point where these relations and their serializations cross. Write down what you see. It should take at least a couple of sentences.
6. You knew this was coming. Choose a third relation, line up the terms according to the sequential order it suggests, and add this, in a new drawing, to your earlier x- and y-axes. Think about all of these together –see them as horses if it helps. You know how to construct such diagrams, but now you know why they present *a kind of thinking*. All of that thinking is packed and stuffed and squeezed into a diagram like this. So think about all that is in there –the regions of thought, the conceptions, the concepts, the class, the elements, the relations, the terms, and most important, how all of it serves your current purpose. Write a paragraph about this complex unity that is your day on Rancho Logos.
7. Now, assert something relevant to all this, about the rivers you chose. Write down your assertion. This is possibly the first fully explicit assertion you have ever made, the first where you knew in detail and could take responsibility for every aspect of what it means. Congratulations. For this purpose, with these concepts (and these concepts alone), you’re an expert.



Chapter 14

ANALOGY

You have learned where concepts stand in relation to your thinking. They are “determinate” versions of conceptions, of your vague ideas you toss around freely. To get that lariat around a conception and lead it to a corral is a lot of effort, but once that conception-horse is in the barn, you usually don’t have to catch it again. It’s there to be ridden, but you have to name it and train it, so spending some time in the corral with a mix of other concepts is needed. You go to school for that. Think of your major as your barn and the college/university as a training ranch. Each class is a series of corral sessions.

You may have noticed that all my talk of horses and corrals and barns is one huge, extended *analogy*. In my experience, analogies help people visualize what is being talked about and helps them “see” relations that might be difficult otherwise. Abstract relations are



very simple, once you “see” them (in your “mind’s eye,” so to speak –which is an analogy), but getting to that point where we see them can be a real challenge. Some people do it very quickly and naturally. Other people are like me: they *need* a visual image to help them understand what is being said.

But what are these analogies? How do they work and why do they work? What are their limits and drawbacks? The importance of analogies is this: **we reason with them**. The movement of our thinking is encouraged by analogies, and it sometimes moves *within* and *by* analogies. *Feeling* such movement in one example, a familiar one, can help us identify similar feelings in similar instances. You may not know how a derivative in calculus works, but you may understand what happens when you adjust the fuel-air mixture for a simple engine. More fuel, higher idle; more air, lower idle. Believe it or not, integrals and derivatives work in a closely analogous fashion in calculus. The lower or higher idle is the derivative; the mixing of air and fuel is the integral. I swear it’s analogous. Now, if only your calculus teacher had taught by analogy . . .

What an Analogy Is Not

Before we can get further on what an analogy is, we have to spend a little time on what it isn’t. Some people confuse analogies with metaphors. That isn’t right. Metaphors are *immediate* substitutions, a pre-rational grasping of a possibility. It does not rise to the level of being a relation, it is an *identification* of one thing *as* another thing: “your eyes are (is_s) moons,” or “the planets dance (is_s) their orbits,” and so on. The orbits are not *like* dances, they *are* dances; the eyes are not merely *like* moons, they *are* moons (in the moment I make the metaphor).

This immediate substitution, as I said some chapters back, works just as your thinking is an immediate substitute for the part of the world you are thinking *about*. So metaphors put one thing in the place of another, without remainder, in the moment the metaphor is made. That is why thinking sometimes isn’t quite adequate: it *isn’t* the world, it’s a metaphor *for it*, an immediate substitute for the world. There is always more to the world than your thinking can include, and so the substitution can go badly, but it can also work, depending on whether your thinking includes the relevant aspects of the world that serve your purposes. Some metaphors “work” and some really don’t. A bad metaphor calls attention to the act of substitution. If I say “your eyes are water balloons,” you’ll say “what?” The substitution didn’t work.

Your words, when spoken, are (if you are sincere) substitutes for your thinking and feeling –which is why they often will not be adequate. The speaking is not the actual feeling or the actual thinking, but it can be better or worse at acting as a substitute. Sometimes it really does approach “identity,” when we are “speaking from the heart,” for example, or when our intentions are “crystal clear.” (Note that



these are metaphors.)

The pitfall with metaphors is that we just make them spontaneously, unconsciously, and then take them immediately for whatever they *are about*. We also forget that our thinking never includes the whole of what we are trying to think about, including only the part we know and make an effort to include. Much is left out, even when we try our hardest. Metaphors are wonderful, which is to say occasions that make us wonder. But they are closer to magic than to reliable tools for communication.

Using words is often an immediate substitute for action, and therefore a kind of metaphoric action. You could fight with your partner, or you could try talking instead. If you fight, you need magic to work through it. It happens. But if you want something a little more reliable, try reasonable discussion; fewer metaphors, more analogies. Once again, when the words are effective, you don't have to act. If you say "please pass the salt," and someone does, the words were sufficient as substitutes for the action. We often don't notice the substitution, and when we don't, the identity of the words used and the action performed by someone who hears them is metaphoric and magical. It is not analogy.

Making Analogies

Analogies are not made this way, by immediate substitution and the presumption that one thing can share the identity of another thing. Analogies are *devised*. If you devise your immediate substitutions by a rational process, the basis of those metaphors is analogical, and they are no longer immediate substitutions. To give an example, one technique for generating metaphors is to just add two nouns together that are not usually used together: "his hammer hand upon the door," or "his goblin bootheels on the floor," or visiting with my "rocking chair friends," and so on. You can look around you and just add any two things together. I am looking at a stapler on my desk. The idea of comfort is in my mind for some reason. How about a "comfort stapler." What sort of thing would that be? A device for binding comforts together? That's an interesting idea. I never considered it before. I wish I had a comfort stapler, a device for binding one pleasure to another.

But notice, that stapler is no longer a literal stapler, nor are the comforts the usual comforts. In putting these together, we have said they are *not* what the usually are, but something else. Analogies begin with negation, with the very opposite of identification. "Rocking chair friends" may look like metaphor, but in its inception, I just created it by taking two nouns, treating them as more flexible than they really are, and then combining them to see what thought they generated. It is really a collapsed analogy in this case. But a poet might use this metaphor on the basis of an insight into identity that I did not have until *after* I devised it. I don't *believe* the substitution, seamlessly, because I *devised the relation* with a technique, and it is a relation, *not* an identity, and I know that and *I can't un-know it*.



Analogies are not immediate, but rather are highly mediated in the way they operate. What I mean is that no one takes an analogy to be identified with what it is about. What if I say “just because you’re in a garage, that doesn’t make you a car.” You are not a “garage car.” This is a way of saying a person is pretending to be something and using the context to make it seem convincing. The negation makes the devising more obvious. But if I say “You’re just a garage car.” That sounds like I’m saying you aren’t operable when left outside in the weather. The word “just” hints at the negation, because it implies “you are a garage car and nothing else.” I am using an analogy to call attention to the included and the excluded aspects of the relations. But surely no one thinks I am really talking about cars and garages. I’m talking about kinds of people and their characteristics. I’m not talking about what I’m talking about. Get it?

The Space in Between

In between analogies and metaphors we find *similes*. These are metaphoric *comparisons*, not immediate substitutes, but they are not complete analogies. If I say “the house is sealed up tight as a drum,” you know I am transferring the tightness of a drumhead stretched over a drum shell to describe how well the windows and doors keep out the weather and pests, maybe also vampires and intruders. But you don’t think the house *is* a drum, and you usually wouldn’t have an image in your head of a drum-house. So it is not an analogy made by the two-noun technique.

Similes tend to be unpoetic and the sort of thing you say from habit. As a kid I had a friend from the country who had a whole passel of colorful similes he would use, maybe even a truckload of similes he used. He’d say “it’s slicker than greased ice out there,” or “I haven’t seen you in a month of Sundays,” and many more. So, a simile is a straight comparison that no one takes as a real substitute. It’s not a metaphor. But its habitual nature means that people don’t really sit around devising similes. And whereas analogies are always devised for a purpose (however idle the purpose may be), it is pretty difficult to come up with new similes. Good rap music makes new similes and metaphors and mixes them. It also sometimes devises analogies, but usually not. Consider “Don’t push me ‘cause I’m close to the edge” in the classic early rap by Grandmaster Flash and the Furious Five. Even the title, “The Jungle,” is a simile. “It’s like a jungle sometimes, it makes me wonder how I keep from going under.” These are comparisons, similes, or, you might say “thought-out metaphors.”

Why not give this a listen and count the similes? Are there any analogies? If so, what? Are there metaphors? Give an example:



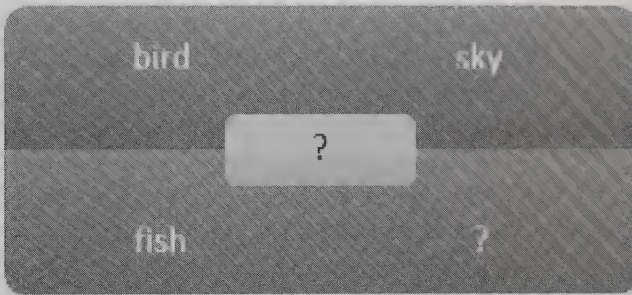


Most of the song is literal description of life in the tough neighborhood. But when there is a point to be made, the simile is the favored tool. There are good reasons for switching from literal description to language that is laden with substitutes – both for action and for the more literal words that would be even more upsetting:

What Analogy Is

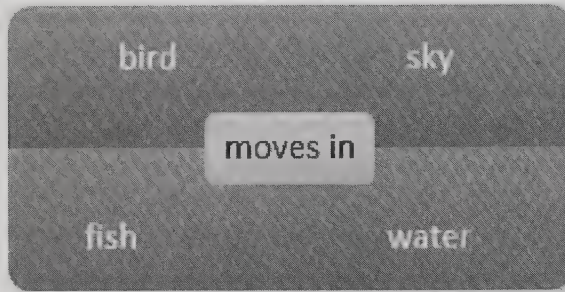
A simile is halfway to being an analogy. A simile compares one thing to another, while a **proper analogy compares and contrasts two contexts and their terms**. We learned in the last chapter that contraries are held in contrast: both can be false, but both cannot be simultaneously true. We learned that sub-contraries are formal comparisons. Both can be true, but they cannot both be false at the same time, due to a shared denotation: either the predicate does or does not apply, but the subject term has been asserted either way. Mr. Square takes us this far.

Regular analogies, composed of four *terms*, allow us to *compare and contrast* propositions at the same time, because the subject and predicate terms are **not** shared. This is an important point because it means that we begin our analogical thinking in difference, not in similarity (as with similes). Consider this:



Can you finish the analogy? It says Bird is to sky as Fish is to what? You know a bird is not a fish, and you know that the question mark in the lower right will be filled with some word that is not “sky” but is somehow like it and unlike it at the same time. You have a few choices. You might say, “sea” because the words “sea” and “sky” are often thought of together. But I think that is not the best choice, even though it isn’t bad. The word “water” is a better choice because there are plenty of fish that don’t live in seas –they also live in lakes and rivers, not to mention fishbowls and aquariums. And an ocean isn’t exactly a sea. The “sea” is sometimes part of an ocean, sometimes not.

But all those fish *move in* water, while birds *move in* the sky. That “moving in” is the relation that “lights up” the whole analogy. So we could finish the thought this way:

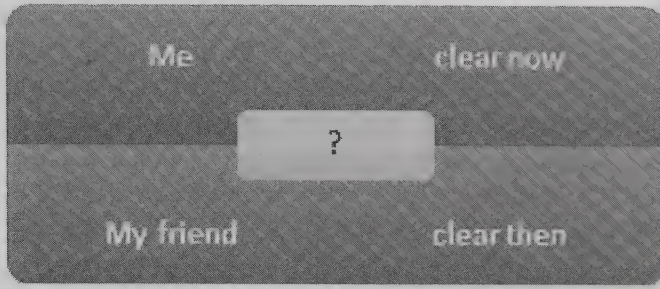


Now, you can see how analogies (presented in this form) help you understand the movement of your thinking. Go back to the first example. Can you feel your mind (and your gut) searching for the right word? And then, when the needed word is knocking on the doorstep of your awareness, how is it a general *conception*, something that includes rivers and lakes and seas and oceans? Then, as you struggle with it, maybe it settles into a concept, and then, only THEN, you lead it into the Analogical Corral, with three other concepts. They circle, they neigh and paw, and then you see the following: their relation is “moving in” or “moving within” a medium, and that medium, analogous to sky, is *water*. Bird is to sky as fish is to water.

It is not the only answer –that will depend on the purpose. But it’s a fair starting place for thinking about the four terms involved: this is the original meaning of the word “principle”: a starting place for thought. You have found a principle, called “moving within.” These terms have infinitely many relations, but you have to admit, this relationship we have asserted makes those horses trot *in step*. It is a tight formation, if not quite ready for a parade. We will need to reflect on what we have asserted, that the relation that holds these terms in a complex unity, one that includes both comparisons and contrasts, is the relation of “moving within.”

Relations Revisited

Now perhaps you understand more clearly what it means to say that “relations make terms ‘visible’.” That is a simile for saying that we can understand a group of terms in one way, tight or loose, when a relation comes clear to us. The English Romantic poet William Wordsworth greeted his friends this way: “what has come clear to you since last we met?” I can hardly imagine a better way to greet a friend. It brings out some serious reflection. The “base terms” will be whatever was clear to me when I last met my friend, and the “analogates” will be the terms that stand in relation to that situation:



Since he has asked me about my present self, I associate him with my past self and whatever was clear then, but compare and contrast to my present self and what is clear now. This assumes I am not my former self and that what is clear now was not clear then. Those “nots” are how we can tell this is a reflective exercise. Now, how to bring these base terms together with their analogates? There may be many good answers, but my friend does not seek just any answer, he wants me to apply myself to *us*, as friends, to what matters to us, to what my purposes and endeavors have revealed to me in the lapse since we last met.

Geez. I want to offer a good answer, don't I? I know what you are thinking: wtf? Obviously, to move forward, you have to decide *which* friend asked you this. Until you've done that, you have no shot at an answer. Do you see and appreciate how profoundly context-driven your thinking has to be?

So, let me help you finish this exercise. John said it. Every single one of you knows someone named John. Or Juan, or Johann, or Jean, or Gianni, or Jan, as you please. Fill him in. *He* asked you. Now move forward. Why did he ask you? In my case, the person named John most likely to ask me this question is a first cousin on my mother's side of the family. He means something spiritual by this question. That is the nature of our conversations. I have another close friend named John who wants a political answer. To my cousin I say: “humility, the value of humility.” To my political friend, I say “evil –it's clearer every day.” What do you say to your friend John?

Every Day

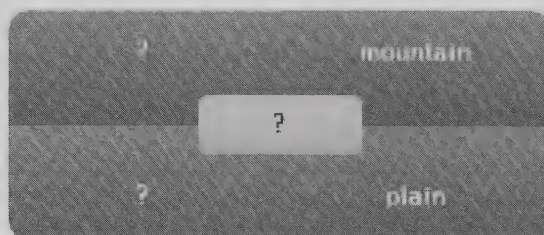
You now see, I hope, that every single day you think analogically, and it is one of the best parts of your day. It makes you feel engaged, alive, really communicating, *getting* somewhere. I have good news and bad news. The good news is that you can get better at thinking in analogies, and that doing so will empower you beyond your wildest dreams. It will make you creative, funny, sharp, a quick study, and you will be fast on your feet.

The bad news is that being a master of analogy will not make you a better person. You will generally be surrounded by people who have not worked on their analogical skills, and you will now have the power to manipulate such people. Resist that urge, ok? This stuff is dynamite in a cement pipe. Do us all a favor and use it for good. But I'm not too worried about you, because you have a ton of work to do before you'll become dangerous to anyone but yourself. You don't believe me? Watch how you mess up the next part.

What you've seen so far is child's play. You have yourself Mr. Square, and a corral for comparing and contrasting trained concepts. You have not learned how to make a concept obey you, let alone fall into parade formation with other concepts. And analogy will take you only part of the way to that bigger goal. You wanna be the horse whisperer? You have much to learn.

Beyond Child's Play

So, you may not have noticed, but when I set up the first example, I gave you three of the four terms, and it was still pretty challenging to work out the middle part: "moving within." But your thinking is a much more open process than that. You can *create* the terms and then try to find the relation, and that isn't too hard. We will practice it in a moment, but before we do, I want to put you on notice about something. Real thinking, when it is constructive, starts with the relation in the middle and builds (or devises) the base terms and the analogates that exemplify that relation. It is quite a task. But before we get to it, try this:



As you can see, you've got analogates and no base terms. Something is to mountain as something else is to plain. There might be many ways to complete this thought, right? But how will we do it? Why don't we look at the relationship between mountains and plains? This requires –you guessed it– generalization and specification. In the first case we ask "what do mountains and plains have in common?" Possible answer: both are "topographical features of land." And what of their contrast? "One is lumpy, the other flat." And? "One is high, the other low."

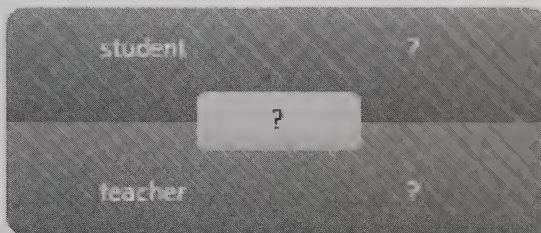
So, what *is* to a mountain as some other thing *is* to a plain? Give up? You are such a wimp.



How about, climbing is to a mountain as crossing is to a plain? And what goes in the middle? Ways of traversing? How about “traversal.” Now, instead of climbing and crossing, do one yourself. Why do you always just sit there waiting for me to do all the mental work for you?

If I say “specify, my young friend, specify.” And perhaps you say, because you are so very sharp, “goat is to mountain as horse is to plain.” And I really must squeal with delight. I certainly never really thought of mountain goats as horses of the mountains, or of horses as mountain goats of the plains. But there you are. Now I have thought of that, thanks to you. Except it wasn’t you was it? Me again. You should be ashamed. And here we place in the middle some feeling and sense of the word “denizen” or “inhabitant” or traverser, or some other term that will enable us to remember what this piece of reasoning felt like and revealed.

Let’s do it the other way. Here are some base terms:



In one way, this isn’t tough at all, because you just trace left to right, fill in anything that a student is, and then find the analogue for “teacher.” If a student is, oh, say younger, then a teacher is what? (Often, not always, but remember, analogies are never without exceptions.) If students are there because they lack knowledge, then perhaps a teacher is there to provide knowledge. Not just any predicate will work, of course (note that I am treating the analogates as predicates. That isn’t absolutely necessary, but it’s handy). You can’t say “student is to mountain” as “teacher is to plain” and expect to be understood, but there is something there, isn’t there? The student must climb, the teacher has already done that and lives on level ground? Traversing is still relevant, isn’t it?

The point is that it feels very different (and it is much harder) to be given the analogates and search for base terms, than to be given base terms and search for analogates. But that brings us to a wonderful problem (it makes us wonder). If you are given a set of analogates and told to find base terms, you can reverse the schema and treat what you were looking at as base terms, find some analogates, and then re-reverse the schema and treat the analogates you found as base terms.

If someone says “find me some base terms for “horse” and “goat” (and no one is likely to ask that, but you can always ask yourself), you can say “ok, horse is to what as goat is to what?” and the give the answer as “mountain is to goat as

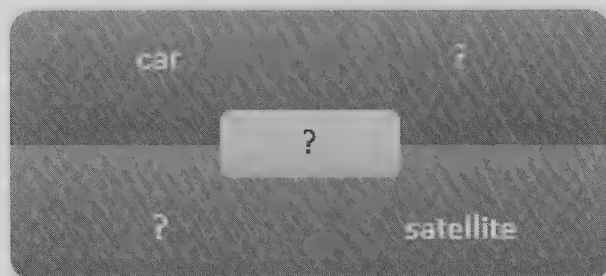


plain is to horse,” where you reversed them once you thought out the analogates, you used them as base terms. It feels different when you reverse the order, but it almost always works. The term in the middle may change, though.

All sorts of weird stuff happens in your thinking when you do this. I just pulled a fast one on you with the example. If I had given you mountain and plane as a pair of base terms and asked for analogates, you never would have said “oh, teacher and student, obviously.” But If I give you teacher and student and then suggest mountain and plane, you’re off into some quite original thinking, no? And where did my suggestion really come from? Thin air? Or was it devised? You tell me.

Intermediate Analogical Thinking

You have just passed the test of low-level creative analogizing. It is time to twist your thinking a bit further. What happens to you in considering this?

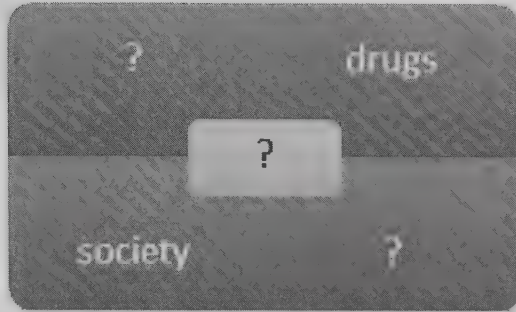


I know very well that your brain is getting fatigued. You don’t want to do this. That is why other people are going to be in control of you (and your life) when you don’t want them to be, because you wimped out when the going got tough. I want you to *do* this, dammit, for your own good. Look at it. Do not cover your forehead with your palm and think of walking away. **You have to do this yourself.** Your teacher can show you, but if you don’t do it yourself, you’re not learning anything.

Plainly: car is to *what* as *what* is to satellite? How will you do it? Look for relations.

Cars take you places. What takes a satellite places? Rocket, right? OK, are you with me? Car is to passenger as rocket is to satellite. In the middle? Some sense of “carrying-a-load.”

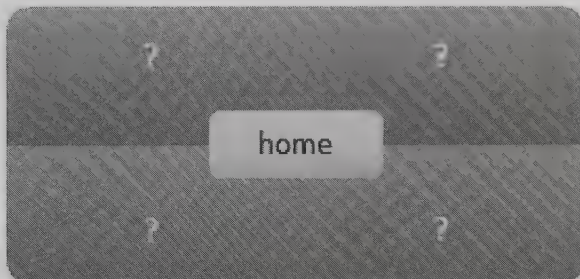
Now, you may have noticed something. There is a close relationship between naming a reference and finding the middle relation that makes the terms of an analogy prance in a showy order. That is correct, but naming a reference is basically a linear form of thinking. Analogical thinking is non-linear and incorporates negations, at its very root. Your turn:



I am not going to do this one for you, but however you may complete it, you are having genuinely intermediate level thoughts, complex unities that have a dynamic feeling and that enable you to *experience* your own thinking while it's moving. Yes, you can move the term "drugs" to the position of a base term, or you could move the term "society" to the role of an analogate, but if you do either of these things, the middle will be different than it will be if you stay with this example long enough to work out at least one answer to the question: something is to drugs as society is to something.

Advanced Analogical Thinking

Now you are ready to consider something really tough. You now have to build your corral and then decide what horses to bring to it for training.



There. It is time for you to think about "home," but not as a subject or a predicate. You must see it as a relation, one that binds four concepts to one another, as comparison and contrast, all in one complex unity. The outcome of this will be not just a concept, but a real *idea*. You will be in a position to write a very nice essay on the *idea* of home, when you have chosen the horses and placed them on this schema. You may start with one, or start with a pair. Let us throw out two concepts: heart and treasure. Where on the schema will you place them? How will you supplement them with two more terms?

Relations make terms visible. Relations bring power and actions to terms. But they just sit there until you place them into analogical order and think through them. Some placements will be provocative, some comforting, some satisfying, some quirky, but you may rest assured that you are now thinking creatively and with



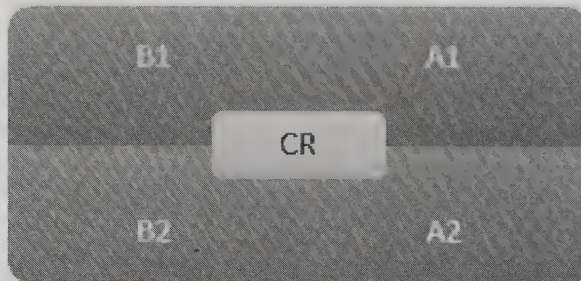
appropriate complexity. Your imagination is what you are using to reflect on the results after you move the pieces, the horses. You sit back and see them trotting or galloping or cantering along, and you grasp something pretty difficult to express about how they work together, and how they fail to do so. All the horses in the analogical corral are frenemies.

Brass Tacks

Getting to the heart of the matter, what will you use analogy for, and how? As I said, analogy is one of the most complex types of thinking humans can learn. You can't really think a whole analogy at once. It involves thinking over twenty relations at once. That's too many to be on top of simultaneously, but you can oscillate among them very quickly, especially with practice. Let's create a method for following our thinking as it moves. We have to *name* the relations.

You already know that the pair of terms on the left are the "base terms." Let's call the one on top B1 and the one on bottom B2. We call the pair of terms on the right the "analogates," so let's call the one on top A1 and the one on bottom A2. B1, B2, A1, and A2 must all be concepts, well-defined and determinate, in order to make our reasoning to be clear and effective.

The term in the middle, which we have learned to call an "idea" and it isn't so clear. On our handy schema, let's call it the CR, for "central relation." It is a relation of relations, as you will see.



Let's begin an enumeration the relations.

- B1 > A1
- B1 > A2
- B1 > B2 (like super/sub-alternation)
- B1 > CR
- B2 > A1
- B2 > A2
- B2 > B1 (like sub/super-alternation)
- B2 > CR



The “>” symbol means “includes” in the sense of “is to.” These relations start with base terms and move to something else. What you are doing when you think from the first term to the second is *thinking a relation* (symbolized by the directional >). That relation is actually serving to make those two terms visible in a particular way. This is the natural (and linear) way to look at analogies. Many logic books do describe this kind of thinking, even saying that it is a very limited way of thinking, is not to be trusted. But if you don’t trust this, you can’t trust anything more abstract. If your teacher argues, tell him/her to jump in a lake. It’s ok, you have my permission.

Almost no logic text points to the CR as being important, but it is in fact the most important part of analogical thinking. There is certainly more that you can do with analogical thinking, but it becomes a bit weird when you resist the linear approach and think backwards instead. I will represent it this way:

$B1 < A1$
 $B1 < A2$
 $A1 > A2$ (like super/sub-alternation)
 $A1 > CR$
 $B2 < A1$
 $B2 < A2$
 $A1 < A2$ (like sub/super-alternation)
 $A2 > CR$

The backward wedge “<” means “is included in,” which is another way of saying “is to.” We will have much more to say about types of inclusion in the last chapters of this book. As you exercise your thinking on this list, you’ll begin to find that each relation feels a bit different. Then you can always take a step back, in your mind, and consider the whole analogy again, perhaps adjusting the way you see your concept, or even choosing a new name for one of your terms to “tighten” the “argument,” as we will discuss in the next chapter.

You can also do this:

$CR > B1$
 $CR > B2$
 $CR > A1$
 $CR > A2$

This feels like sharpening an idea gradually into a conception and then a concept. This is working with “ideas.”



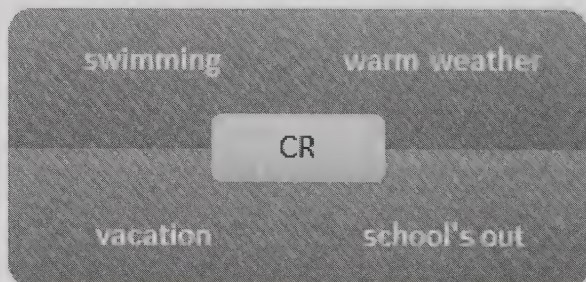
Ideas

Ideas are really the source of conceptions, while, as you know, concepts are distilled from conceptions. An idea is an infinite source of conceptions, and they are very open-ended. You're never really finished thinking about something when you treat it as an idea.

But be aware that in your everyday life, the idea, the conception, and the concept might go by the same name. If I'm talking about "just" my idea and you are interpreting it as a fully formed concept, you and I will have trouble understanding one another. A famous example would be "God." There is the idea of God, which is behind many different conceptions, and the shared conceptions held by various religions and sects may still give rise to very different determinate concepts. So you can take the word "God" and see it as an idea, which is very open-ended, or as a conception (a vague constellation of predicates), or as a very well-defined concept.

But the same thing is true of almost anything worth thinking about. Let's take the *idea* of "summer." I love the idea. It's one of my favorites. The idea includes "no school," and a thousand other welcome things, warm weather, endless greenery, vacations, and so on. The *concept* of summer seems to be June 21 to September 21, in the Northern Hemisphere. But that concept seems not very important to very many things. Summer as a *conception* starts when the weather gets hot, or when school lets out, or with Memorial Day weekend in the USA, or whenever the swimming pools open in your town, and so on, and lasts until Labor Day, or the pool closes, or the first cool day. You know all this.

Place summer in the middle of an analogy, as the CR and see what happens. When you *start* with an idea, you work your way outwards to some term that really expresses a conception, but when you put that first term at B1 and ponder what sort of A1 you might choose, you return to linear thinking. How about: swimming (B1) > warm weather (A1). Now, what purpose do you choose? How about to make us all feel "summer" as the idea, without saying it? How about we add vacation (B2) > school's out (A2). Now forget about the CR for a moment.





This is a fairly loose analogy. It will succeed by *association* in raising the CR of “summer” in many people’s minds, and assuming that was your purpose, you’ll probably succeed. This is a great strategy for creating “enthymemes,” which are arguments with a term missing. We will look at that later.

For now, get used to the freedom of plugging in terms in any position and thinking the result through.

EXERCISES

You could see this coming, I’m sure. But here is a list of random nouns. These came from an on-line random noun generator:



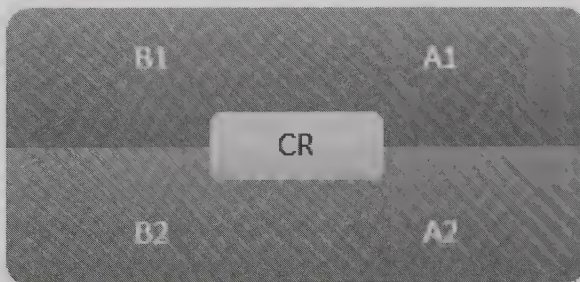
<https://url.ryanbooks.com/ke2G2>

currency airport championship affair estate family measurement cheek
database child

police proposal media editor conclusion insurance football presentation effort
passion

obligation employer depression assistance inflation running emotion preference
equipment

For each question below, draw an analogy schema like this:



1. Choose one noun from the list. Place it at B1. Now finish an analogy choosing any words you like. The don’t have to be on the list. Be sure to name the Central Relation.
2. Choose a different noun from the list. Place it at A1. Now finish an analogy choosing any words you like. The don’t have to be on the list. Be sure to name the Central Relation.



3. Choose two nouns you haven't yet used from the list. Place one at B1 and one at B2. Now finish an analogy choosing any words you like. The don't have to be on the list. Be sure to name the Central Relation.
4. Choose two nouns you haven't yet used from the list. Place one at A1 and the other at A2. Now finish an analogy choosing any words you like. The don't have to be on the list. Be sure to name the Central Relation.
5. Choose three nouns from the list that fit together as $B1 > A1$, and B2. To complete the analogy, choose any word (it doesn't have to be on the list) for A2. Name the central relation.
6. Choose one word from the list and place it at CR. Complete the analogy by constructing a fitting $B1 > A1$ as $B2 > A2$.
7. Be aware that nouns can be made into verbs, and used as a predicates. Take your answer to number 1 above and transform A1 and A2 into verbs. Do you need to rename the Central Relation? If so, do it. Sometimes verbing your nouns make the CR easier, but verbing weirds language, so this is just an exercise in thinking, not in expressing thought.

Chapter 15

LOGICAL OPERATORS (AND, OR, AND NOT)

You have learned to think in a number of ways, and to observe yourself in the process. You also have acquired some useful tools for thinking about logical relations, all the way from “south of” to sub-alternation, to comparison, to generalization and specification, to analogizing. There are infinitely many ways to think about concepts, conceptions, and ideas. When these mental things are expressed in words, we can hook them together with other words. For example:

Cake and Ice Cream

Everyone knows that cake is different from ice cream, as dessert foods that exist in the world. (There's your substantive expansion, dessert foods.) Obviously cake and ice cream can be combined and thought of together. The *conception* of cake can be stretched in many



directions. Watch those crazy British baking shows. Sometimes you may wonder whether a given object is really still “a cake.”



<https://url.rylanbooks.com/UnEGG>

As you can see, these contestants have conceptions that they bring into the world as embodied concepts, and sometimes it works. Sometimes it doesn't. For example, to my eye, the first contestant who created a Union Jack within the sponge succeeded and the second who tried that, not so much. Very often these contestants tested the very *idea* of a cake, like the one contestant with the cake that is made to look like a pie.

Or, on the other hand, the contestant who attempts the “sun” and just doesn't quite get it into the form that would enable others to *interpret* it, and in fact I don't quite understand what he was even trying to express/assert with that cake. Did he mean “sunrise”? Conceptions don't always get fully formed. Notice how the older judge several times says that anyone would immediately “know” what the intention was. And then there is the contestant who really fails to make a cake at all. The whole range is here, of the path from conception through concept to assertion, of denotation, connotation and reference, of success and failure of assertion.

And yes, all those cakes were analogies as well. The Central Relation is exactly what the older judge was referring to when she said anyone would know what the goal was. After all, the Union Jack sponge is not a Union Jack, it's a cake. The cake is the first order of business –it must really be a cake, and taste good. That is what it is. But it is not a flag, a sun, and so on. The cake sponge is to its food coloring as the flag is to its fabric dye, for example. It may be a bad sponge or poor cloth, but without it, you don't have a cake or a flag. Much of what you do every day depends on your ability to analogize. When you begin to notice it, you'll find it hard to believe you never noticed it before.

A Little More Training

To train the idea of a cake into a conception and then into a concept is very much like attempting to communicate. You have an idea of what you want to assert, then you consider how you will form it, and then when it comes out, in speaking, writing, gesturing, there it is. And it *means what it means* to whoever interprets it. It is no longer your mental possession. Obviously I am using the cake as an extended analogy. We can lead the concept “cake” into the corral by making it determinate. What are the usual elements? Eggs, milk or water, flour (or something with similar substance), butter or oil, sugar (or a sweetener), a leavening agent, flavoring (including salt), heat (an oven usually), and a pan to give it a physical shape. Plus, generally, a recipe.

All of these ingredients are themselves also susceptible to being made into determinate concepts, some simpler, some more complex, but since the barn is called “dessert foods” (really, the barn is Edibles, it’s this constellation of ideas we call “dessert foods” *within* the barn of Edibles), let’s just keep things in the cake corral for now. (Heaven help us if we try to get our minds around the concept of an egg, although the conception is easy enough.) Now, let’s look for the *essential* elements, the ones that *must* be there in a cake.

What can we *drop* from this list of typical ingredients and still have a cake? In truth, you could drop any one or two of these ingredients, even flour, and still get a cake. But you can’t drop more than two or three.

Does that mean “cake,” as such, is less than fully determinate, as a concept? Yes, but that is true of nearly every concept. Very few concepts are so perfectly determinate as to be beyond dispute. Very often in a dictionary you will find the range of essential elements that contribute to the meaning of a word, but they don’t usually say which ones might be subtracted while maintaining the meaning. Yes, water is H_2O , and if you subtract the hydrogen, you just have oxygen, and vice-versa, and this comes very close to a wholly determinate essential core of the concept of “water.”

And yet, a very famous philosopher, Hilary Putnam (1926-2017), once questioned whether the meaning of “water” was determined by that core. Many people think he successfully showed that water would still be water even if it wasn’t H_2O , so long as it functioned like water. He also pointed out that “water” meant “the wet stuff” even before the human race knew its molecular structure, so were all those humans failing to mean “water” when they said the word, because they failed to be aware that H_2O was the determinate essential core of the concept? It seems unreasonable to say they didn’t know what they meant.

Finally, Some Ice Cream

By contrast, ice cream is a somewhat simpler conception than cake. Frozen cream with sugar and flavoring. You’ll need a cow, or some other milk-providing beast. And generally, you’ll need a machine of some sort to combine the ingredients. The machine may be simple, but it’s pretty hard to make the stuff without mechanical assistance. And we can have a similar discussion here about the essential core elements becoming a determinate concept.

The whole situation reminds one of Justice Powell’s famous statement that he couldn’t define “obscenity” but he knew it when he saw it. And that will have to be our solution, at some level. It takes judgment for those British baking judges to inform one contestant that, sadly, she hasn’t actually succeeded in making a cake at all. This is why we have studied judgment and interpretation. In fact, whether



some single thing in front of you, on a plate, is or is not cake is something you have to decide. And the same with ice cream, and with obscenity, and with God, and any other concept you want to name.

But when we have considered the concepts of cake and ice cream enough, and we feel we have a hold on our meaning, now what? *We notice how they can be related.* Cake *and* ice cream. That means both. They may be on separate plates, and still we have both, right? That seems like a shame, so I am going to combine mine on one plate and you can do whatever you want. Still, I have a question for you:

Does “and” *mean* the same thing for me when I dump my ice cream on the cake plate as it *means* for you, sitting there with cake on one plate and ice cream on another? The answer is “not quite.” The word “and” has many shades of meaning, vaguely suggesting the combination or togetherness of things. They might share the same space (my plate), or be contiguous (your plates), or be associated in our thinking in about a million other ways. It’s all still “and.”

Sometimes the word “and” has a temporal meaning: “She got married and had a baby.” I’m sure you’ll agree that this is different from “She had a baby and got married.” The word “and” sometimes means “and then . . .” to express the conjunction of events in an order of before and after.

In order to get a handle on how to think of “and” as combining elements that have been made into determinate concepts, and for the purpose of thinking about them clearly, we have to give “and” a special definition. The word “and” in logic means “think of these things together.” Do it in one single thought, to the best of your ability. There they are, before your mind: cake and ice cream.

Having Your Cake, and Eating It Too

But there is more. *Because* we have spent so much effort making our elements into determinate concepts, **we can think them as together or one at a time, without losing any of their meaning.** It could mean your plate, or my plate, cake *and then* ice cream, ice cream *and then* cake, and, for logic, it’s still expressed as “cake and ice cream.” The logical sense of “and” *includes* all the possibilities of combination that are consistent with reflexivity, symmetry, and transitivity. Nevermind what those are for now (*or*, heck, look it up on-line if you’re curious), just take my word for it when I say that determinate concepts (horses in the corral) all have these features. They are the door posts and frame to the corral; nothing gets through without yielding to these requirements. And this is part of what is so difficult about logic. When you are using a word like “and” logically, you are **generalizing** the meaning of “and,” summing together all the things “and” *might* mean, while simplifying all that into *an operation of combining*.



We haven't even scraped the surface of all the ways that "and" in logic smooshes together a whole world of ways of combining. For example, did you know that in logic "but" means the same thing as "and"? If I say, "let's have cake, but also some ice cream." That's "and." I might say "Let's go to the zoo, but let's stop for a drink first." (Nobody wants to go to the zoo sober.) That is zoo *and* drink. Yes, it's "drink and then zoo," *but* in logic, it doesn't matter about the order in time, or whether the cake and ice cream are on one plate or two, whether we go to the zoo and then drink, or, more appropriately, drink and then go to the zoo (if we ever get around to it).

There are lots of words that mean "and": even though, although, moreover, in addition, still, yet, nevertheless, indeed, notwithstanding, however, whenever, further, furthermore, while, besides, so, plus, and so on. There are lots more. Sometimes just a comma or semicolon works as a conjunction: "bring me cake, ice cream, a fork; don't forget to smile." Some of these give a stronger sense of contrast and individuation, juxtaposition, etc. Others give a stronger sense of association, continuity, contiguity, congruence, etc. But all are combined as members of some class, and conjoined in some way so as to be usable as determinate concepts..

As an *operation*, as long as you *have* both elements, then both are *included*. "And" is an operation that says "include this term with this other one (or with *these* other ones, since it can be as many other terms as you choose)." In short, *think of them together*, so whenever you think of one, *include* the other one(s). Further, if you think of one while actively *excluding* the other(s), you aren't following the instructions that come with "and."

And (Conjunction)

Now, when you were working with analogies, you were doing "and" operations. Analogies combine terms in special ways, because "is to" and "as" (bird **is to** sky **as** fish **is to** water) both mean "and" in a certain way. Analogies conjoin both comparative and contrasting relations. The contrasts are implicit –the bird is not the fish, manifestly, but is like it in some way; the water is not the sky, etc. The comparisons are explicit, and that is what you will understand first. But you can feel the comparisons and contrasts together, as a sort of "unit" of meaning.

Now, I hope you perceive that "and" is a concept in logic, as well as an amazingly useful *thought*. In logic, it is distilled into an operation with certain characteristics that you need to remember. It means *inclusion* of concepts together while maintaining their individual meanings *as* determinate concepts (that is what "reflexivity" means, by the way). If you don't eat your cake and ice cream quickly enough, you will end up with a substance that isn't either cake or ice cream any more. The ice is gone and you have "craque," which may taste good, but it isn't what we meant when we framed the concepts earlier. Concepts, even if there is



some vagueness in their essential core, must maintain their individuality when we do logic. Made visible by relations, they are terms, and as terms, they are units of thought. You can move them around, so long as you treat them as symmetrical and transitive. Those are rules about how to move horses in the corral. They are not required in the barn.

Combining units of thought to include one another is called “conjunction,” and that is what we mean by “and” in logic. Logical conjunction has some characteristics that ordinary, loose combination does not have. It does not require coexistence in time or space. I can think “Julius Caesar *and* the Tooth Fairy.” Those concepts have never been anywhere together in the real world, they cannot shake hands, and it isn’t easy to imagine what sort of reasoning requires both concepts, but this is logic, and this sort of worry doesn’t stop us. I can conjoin them as concepts. Indeed, I could tell a perfectly understandable story about the Tooth Fairy visiting Julius Caesar, oh, let’s say, after a battle, to collect the teeth knocked out in the struggle. “Julius Caesar and the Tooth Fairy.” That is what I’ll call my story.

(I am tempted to write it; it might be hilarious —Julius unthinkingly leaves his lost teeth on the bed while taking his armor off, and then later, in the dark, they end up under the pillow. The Tooth Fairy shows up for regular duty, Caesar does not know about the Tooth Fairy, and so tackles her and holds a knife on her demanding to know what sort of assassin she is, and she holds up some coins and he thinks she’s trying to buy her way out of it . . . you finish the story.)

The point is that determinate concepts are nearly magical in their capacity to be moved around and combined and *thought of* in various orders and arrangements. The magic is a fantasy of our mental making, in most logical conjunctions, and we will be guarding against that wilder kind of combining (Julius and the Tooth Fairy), as you will see. But we all have to admit it can be fun. Sometimes we want to restrict our terms to the rules we learned from Mr. Square. Most of the relations Mr. Square gives us are types of inclusion: contrariety, sub-contrariety, sub-alternation, and super-alternation are all types of inclusion. They are restricted ways of saying “and.”

When we learned to build serial predications, we were doing a kind of logical “and-ing” (remember any noun can be verbed). Oaks are trees *and* trees are plants *and* plants are living things, *and* so on. Remember this too: there’s a bump *and* it’s on the knot *and* that’s on the log *and* that’s in the hole *and* the hole is in the bottom of the sea. These serial predications express a pretty strong sense of inclusion, because you’re stuffing the first subject into the first predicate, without remainder, and then that whole pile gets stuffed into the next predicate, and that continues until someone negates something: “Don’t re-enact scenes from *Platoon* with Charlie Sheen.”



And More

So the range of things “and” can do in logic is quite wide. Logical conjunction is highly generalized, but inclusion is its main work. We will see that it has a few other superpowers in the following chapters. But one thing needs to be pointed out before we go further. There is a weird relationship between logical conjunction and mathematical addition. They actually follow most of the same laws.

They are generally commutative. You can usually switch the order and get the same meaning. But not always. It does not work for cake recipes by the way, where the order of combination is crucial, and yet one cannot say that the recipe is “illogical.” Rather, temporal order is built-in to the logic of conjunction in some instances. But temporal conjunctions are often asymmetrical and intransitive, so we ignore them in the corral.

Logical conjunctions, like mathematical addition and multiplication, are sometimes “associative” in the formal sense: if you combine A with B first, and then AB with C, you may get the same thing by combining B with C first and then BC with A. But sometimes it does not work with logical conjunction, even when the concepts have been made as determinate as possible. A recipe is another example. There are concepts that are difficult to make wholly determinate, especially where the rules of symmetry ($a = b$ means the same as $b = a$) and transitivity (where $a = b$ and $b = c$, then $a = c$) are imposed on them.

Some concepts are just inherently symmetrical, so it often works, but even in math, things get weird with multiplying by zero. Some concepts are inherently transitive: when $A \text{ r } B$ and $B \text{ r } C$, then $A \text{ r } C$. Not always the case in either math or logic, but it is a form of combination to look for in the barn, and in the corral, you must assume it.

But one thing you might not have considered is that multiplication is also a kind of conjunctive combination. So is finding integrals and derivatives in calculus. Drawing a straight line between two points is conjunctive combination. Triangulating, summing functions, measuring are all conjunctive combinations. To render them logical conjunctions requires imposing reflexivity, symmetry and transitivity on them, but it can be done, with some loss of meaning. Also, any relation that a part can have to a larger whole is reducible as conjunction. The relationship between logical conjunction and the world of mathematical relations is complex, but it is good to remember that **inclusion according to some rules and/or limitations is what makes the conjunction “logical,”** even if combination is also something else or something more than logical.



Or (Disjunction)

Things get a little tricky now. In logic the word “and” overlaps with the word “or” in a number of ways. It is inconvenient. But we have to deal with it. If I say to you “cake or ice cream?” you might just say “yes.” I am supposed to understand that you want both, and probably piled together. But what if I have two plates, one with cake only, one with ice cream only, and I approach your table, and I indicate with a gesture first the cake and then the ice cream, and I say “cake *or* ice cream?” I grant that only a sadistic monster would do this, but let’s try to imagine it. You are supposed to understand that you have to choose and you can have only one.

In this case, the meaning of “or” seems to *exclude* the combination of the two terms. You do the natural thing and ask “can I have both?” Perhaps I hand you both, and you understand my “or” really meant “and.” Sometimes “or” means that. If I say “there is only enough for each of us to have one,” then you are crestfallen *and* you point to the preferred plate. I know this is painful to think about, but sometimes “or” really means exclusion. The trouble is that in a world of negotiation and sharing and give and take, we have to decide, more or less constantly, how stark the contrast is when we say “or.”

There are some very stark contrasts expressed in Mr. Square. Contradiction is a very strong contrast. It is this: you can’t really even *think* about the E- and the I-proposition at the same time. When you are thinking “some s is p” you cannot think “no s is p.” Similarly, there is no way to think the A- and the O-proposition at the same time. If you are thinking “all s is p” you just can’t think “some s is not p” along with it. They are really separate acts of thinking, and you have to choose one at the expense of the other. They exclude one another at that very high level of abstraction.

The E-proposition all by itself has a very stark contrast: “No s is p.” It means not a single thing in the denotation is described by the predicate. So, you can think about the denotation all you wish, but the connotation will not be added to that meaning. It is mutual exclusion too! When you think of the predicate term, and its whole field of connotation, you won’t find the subject term anywhere. With the E-proposition, there is no negotiation. These horses refuse to enter the same corral; if the subject term is available, the predicate term is unavailable, and vice versa. That is a pretty stark “or.”

Then there is the very disappointing exclusion that accompanies contraries. You can’t have both at the same time, only one *or* the other, *but* you *can* choose to have neither. Here’s the cake, here’s the ice cream, you can’t have both, but you can choose to have neither. I hate contraries. The inclusion there is a negative inclusion: you can keep the cake and ice cream “together” only by refusing both. Ouch. No. It’s like trying to decide whom to vote for when you don’t like either choice, and there are only two.



I remember a singer-songwriter who was doing a concert in my town, and he had three studio albums he had recorded. Someone asked which he liked best. He said "they're like my children . . ." and we all expected him to say "I can't choose between them," but he said "I can't stand to see them separated." So I bought all three.

But Mr. Square has another interesting exclusion: the relation between the O- and the I-proposition. They *include* the same subject term, the denotation, but the predicate term of the O- *excludes* the predicate term of the I-proposition. Starkly. So, this is inclusion ("and") at one level, and exclusion ("or") at another. You can pretty well think the I- and the O- together: Here is a bunch of cookies, some are burnt, some are not burnt, but they're all on the plate. This kind of "or" is *very* useful in logic, in persuasion, and in life. Some people really do like their cookies carbonized and darkened. Some don't. As long as they're minimally edible, they're still cookies, right? But one of the great truths of community is nobody gets everything they want; you have to settle for some, and also do without some of what you want. If you truly need "some more" *to survive*, you have a good case. Otherwise grow up and compromise.

The meanings of "or" we get from Mr. Square are fairly clear and straight-forward. **Whatever is excluded in a contrast is disjoined with the concept from which it was excluded.** These are simple disjunctions, however, and "or" does get more complicated than that.

Complex Disjunction

Similarly, when we were doing analogies, there is some contrast and exclusion at work in our thinking. Recall that when we think in analogies, we compare and contrast at the same time. Certain terms, starting out different, end up sharing some important relations. Still *either* one is a fish *or* a bird, but not both. And that analogate over there is either the sea or the sky, but not both. **One cannot think in analogies without disjoining the terms.** Further, the subject *is not* the predicate, just as the base terms *are not* the analogates, although they are included by some relation, some conjunction ("is to")

The meanings of "or," the disjunctions, can be very subtle in these complex relations. In fact, some *relations* are themselves complex extended disjunctions. Let's say you're an anteater. That means you are included in the suborder of *vermilingua*.





But now you'll be either a giant anteater, *or* a silky anteater, *or* a northern tamandua, *or* a southern tamandua (*or* you are extinct). These types of anteaters are exclusive of one another, but included in a wider group.

There are many other ways of including in one way while excluding in another way, or of excluding in one way while including in another. The way to think about it is this: **if you start your thinking with exclusion, your dominant thought is disjunctive; if you start out with an inclusion, your dominant thought is conjunctive.** If you are driving down the road and you come to a fork, you will think disjunctively about what awaits you down this road or that one, and you may assume that these roads end in different places. (They might not, of course, so keep that in mind.) It's like that with most choices. They lead to disjunctive thinking, which can be highly creative, but also it makes us feel, in our guts, the road *not* taken and a loss of values we might have discovered on that road.

Conjunction feels otherwise. It feels like cake and ice cream, together, or even in sequence (maybe I eat my ice cream, before it melts, and then my cake). When two choices really do exclude one another, you feel the concept on either side of "*or*" as permanently exclusive of one another. Where the exclusion is not permanent, you're really thinking of *possible* conjunction. There have been some philosophers who believe conjunction and disjunction are equals in the universe, that wherever we find and recognize and describe conjunction and continuity, we also find equal disjunction and discontinuity. William James (1842-1910) was one such philosopher. I mentioned him back when I was talking about the idea of truth. I think the "*and*" and the "*or*" are usually out of balance in our experience, but in the grand scheme of things, James might be right: they may be proportional.

Reflective Or

When we come upon an "*or*" that is really unforgiving in its level of exclusion, we begin to approach *negation*. Sometimes it is expressed as a thing called "the law of excluded middle," and symbolized like this: $(p \vee \neg p)$. Nobody ever really passed such a "law," and it *isn't* a "law" in any land except the one called "Narrow-Minded Land." But as an *operation*, it means "treat these two terms as seriously mutually exclusive." Whatever is included the first *p*, the second *p* is definitely *not that*. Indeed, it is everything except that.

But what *is* included in the second *p*, the one with the negation symbol in front of it? That is very difficult to say, since the only thing we know about it, when it is expressed this way, is that there is definitely none of what the first *p* includes. The second *p* could include everything in the world except the *p*-stuff, or just *some* of what's in the world and also *not* included in the first *p*. We don't know, which is why this so-called law is a vacuous abstraction, to use the words of the philosopher Alfred North Whitehead (1862-1947), who I mentioned before.



This fellow Whitehead wrote a famous book with another person, named Bertrand Russell (1870-1968), with the pretentious title of *Principia Mathematica*. In this book they tried to show that every mathematical idea could be reduced to an idea in logic. This wasn't a very good idea and it failed, but Russell would not admit it, while Whitehead did admit it, and called Russell "narrow-minded," which was true because Russell insisted that the world should yield to the "law of excluded middle," and the world refused to cooperate with Russell. Whitehead also stopped cooperating with Russell, although it is unclear whether it was because of the law of excluded middle or the fact that Russell kept hitting on Whitehead's wife. When you think about, that's sort of the same thing.

I am telling you this because that book with the pretentious title (borrowed from Isaac Newton) became the basis for a hundred years of narrow-minded logic that you don't need to learn or think about. Unfortunately, many of your friends will be learning that vacuously abstract logic Russell liked as if it were the only logic that exists. You cannot do a single important thing with that logic, not even hit on someone's spouse. Be glad that your teacher isn't narrow-minded and cares about whether you learn things that are actually important to you.

How does this affect "or"? Well, when the use of "or" approaches total exclusion *(as in "buzz off Bertie, I never want to talk to you again"), you reach the idea of "not," and that is a different idea from "or." The very nature of thinking "or" is to see two things in a relation of contrast. When the contrast is pressed to a logical extreme (that never really happens in the real world), then you have negation, and negation is, as we have learned, another way of saying that active thinking has ceased and reflective thinking has begun. The only way to negate something, flatly and completely, is to remove it from all relation to whatever you are thinking about actively, to set it into a different world. In other words, negation is an action, and not the same action as whatever you were thinking. **Or is a relation. "Not" is the rejection of that relation, and every other relation.**

That is also part of the reason that things get weird when you try to calculate with zero. In mathematical subtraction, you start with a group of things (usually numbers), and you set aside, or take away some portion of what you *had*. I don't know where you put the portion you took away, but it's not like that portion never existed at all. Rather, you disjoin what you took away with whatever is left. This is "or," but to think of, actively, *both* what you started with *and* what you took away, *along with* what is left over, is to imagine as co-existing that which *was* together but *is now* disjoined.

In mathematical division, you are taking a whole set of things (usually numbers) and breaking them into parts. Those parts are *then* thought of as disjoined. But to think of the new groupings of parts *together with* the way they were *before* you divided them is to imagine *as* co-existing that which *was* together but *is now*

disjoined. What happened to the whole before you divided it? It's not like it never existed, but you may not be able to reverse the operation.

And now consider what happens when you introduce zero into these operations. Subtracting nothing from your whole means doing nothing. It isn't really subtracting. Dividing by zero isn't dividing. Subtraction and division are ways of saying "or" reflectively. They fall well short of negation.

Negation

The third logical operation is "not" or negation. It is actually different from extreme cases of "or," even if the extreme cases of "or" do approach being negations. Negation, as a logical operation means "simple exclusion." There is no such thing in the real world. A very smart philosopher named Henri Bergson (1859-1942) spent a lot of effort showing that this kind of negation really only means choosing to think of something else, apart from whatever you were thinking before. It isn't really simple. It's almost a miracle that you can choose to shift your attention so completely from one thing to another, and so starkly. (I have a long paper about this near miracle. Ask me some time.)

In the real world, there is always relation, never any simple "nots." If you are not married, then there is a potential marriage looming alongside of saying that. If you are not hungry, don't worry, you will be. If the cookies are not burnt, they certainly might have been burnt. In the real world, the meaning of "not" always takes its shape from whatever positive thing, actual or possible, stands in contrast to it. Even in abstract mathematics, dealing with zero is something more or less constantly weirding the relations, since zero gets treated as something that *holds a place* without *numbering* it. The *place* is still there.

In the world of logical relations, we have a place holder that says to every assertion "or not." Do you want to go get a drink? As a question in the real world it is open to many types of "or," but in logic alone, there is the option of saying "or not." It means *doing nothing in place of the drink and also not doing the drink*. For every assertion you make, there is a logical "or not" that trails it and reminds us that we can slip a "nothing at all" into the place of the term, or the whole assertion, or the whole combination of terms.

And why would we do that? Because everything we know of has limits. Even the concept of infinity, no matter how well defined, stands over against whatever is finite. Finite means "not infinite." Your paycheck? Not enough, right? Your height, weight, hair, grades, patience, focus, discipline, generosity . . . not perfect. Whatever you think of, it can be opposed to what it isn't, and that is true even if we have nothing concrete in mind. When we complain that a person is too negative,

what we mean is someone whose thinking is consumed in so many oppositions that it comes down to simply opposing anything and everything. A “contrarian.”

This “not” is something we sometimes make explicit, but it’s always there even if we don’t say it. And everybody *knows* that it is there. I like to make it explicit more often than most people do. My spouse will say “we should go to the movies.” I reply, “as opposed to not going to the movies?” She ignores me. But what I am saying is: “I am reflecting on this possibility, along with its simple negation.” There are times when one does not make this act explicit. If someone asks, “does this outfit look good on me,” it is not wise or polite to reflect on that question. Do not say “as opposed to not looking good on you?” You *know* you are feeling this opposition, even when you don’t think it consciously.

But even when we don’t say it, there it is, inviting us to recognize the limits of whatever we are thinking about. That is why concepts require negation to be thought. They have to be set off from whatever is *not included*, and that is what simple negation does. To have a concept is to negate everything except what is actively meant by the element. Therefore, logical negation is the broadest logical operation, because you cannot do *any* logical thinking without it. The combining (conjunction and disjunction) of terms, elements, concepts, even conceptions and ideas, all occur within the general act of treating *this* corral, *this* barn, *this* part of the ranch, *this* Rancho Logos, and being set apart and exclusive of the alternatives. We “set aside” definitively and determinately by negating, but we can set things aside in softer ways, by disjunction for example.

Operations

We have learned about three logical operations: conjunction, disjunction, and negation. You do not need any other formal operators to do logic. There are also *actions*, like generalization and specification, but these are not operators. One of the main things you can do with “and,” “or” and “not” is hook together propositions. We will be doing that in the next chapter. Sometimes we hook propositions together just to think them through. Sometimes we do it to form a case for some concept or some proposition that integrates several concepts, or differentiates them.

But sometimes these operations are open-ended ways of capturing and expressing our thinking in symbols that abbreviate and generalize the thinking. That is what algebra does, for example. Algebra is not about numbers, it’s about operations on whole groups of numbers at the same time; any number that can satisfy a given variable under the limitation of equality, or “greater than” or “less than” or any other algebraic relation you want to define. It is a way of working with scads of possible numbers and never really getting around to saying which ones.

Logic is like that, but instead of working with whole groups of numbers at the same time, we are working with groups of concepts, and we may not bother to say which ones. As with algebra, the answer is “whichever concepts satisfy our variables.” We can set up and name a class:

$$C = B, R, Y, V, I, G, O$$

The visible spectrum again? Maybe so, but it might be the class of my friends, Brian, Richard, Yvonne, Victor, Irene, George, and Oliver. I never really liked Oliver that much, but I’ll include him. It doesn’t matter if all we want to do is *logical* operations. Any set of symbols can be explored for its purely logical relations, completely apart from how those symbols stand to the class they belong to. Let’s say I want to conjoin, disjoin, and negate my terms.

$$(B \vee R) \cdot \sim(Y \vee G)$$

The wedge “ \vee ” usually means “or” and the dot “ \cdot ” means “and.” The tilde “ \sim ” means “not.” This expression can be read out loud as “B or R and not Y or G.” But you see parentheses too. Those tell you the groupings. It is not Y alone that is being negated, but the *disjunction* of Y and G. That actually means that Y and G are *not* really disjoined (that’s what it says), from which we might infer that they *can be* conjoined, if we wish to think of them that way.

Giving these symbols an “interpretation” means bringing back the class and schema where they were defined, maybe this says something about the visible spectrum, for some purpose I have in mind. Or maybe it’s a comment about the best seating arrangement for my friends. It means set Brian and Robert a bit apart and do not do that with Yvonne and George (best keep them together).

When we use these logical operations, what we are really doing is generalizing some very common relations we find among terms. “And” sums up all the ways things can be included together, and “or” sums up the ways they can be held apart, exclusive of one another in some way and for some reason. “Not” shows us the reciprocity of whatever we have said with what we excluded by saying *just that* and *not* something else. It shows the resistance and the economic cost and limits of thinking about this and not that, as well as, more determinately, “this” and “not this.”

Logic is a tool for thinking lots of groups of thoughts very quickly, without having to fill in the details of what you are thinking about. As a short-cut for thinking, it has some dangers and snares, because not every relation is powerful enough to tame its terms into horses that can be ridden. That requirement of reflexivity is a booger. Some relations, some kinds of conjunction and disjunction, inclusion and exclusion, are just too vague to bring some terms into clear relation. The thing to



remember is that you shouldn't move so far into your generalizations that you are unable to bring them back to the schema you started with. Working with pure abstractions is tempting, and it is easy, in its way, but it isn't important unless you can get back to earth, in terms of the purpose you started with.

Still, some things resist combining. For instance, water and oil remain disjoined even when you combine them. You can shake it up and it will emulsify, but give it time. It *wants* to be disjoined. Some people are like that too. Things in the real world are almost never reducible to concepts, and so, when you are thinking about them, it's not really the whole reality that the concept was taken from. You're thinking with concepts, not things. They are substitutes for things.

We will be doing some activities with "and" and "or" and "not" in what comes next.

EXERCISES

Here is a list of nouns. It may look familiar.

currency airport championship affair estate family measurement cheek
database child

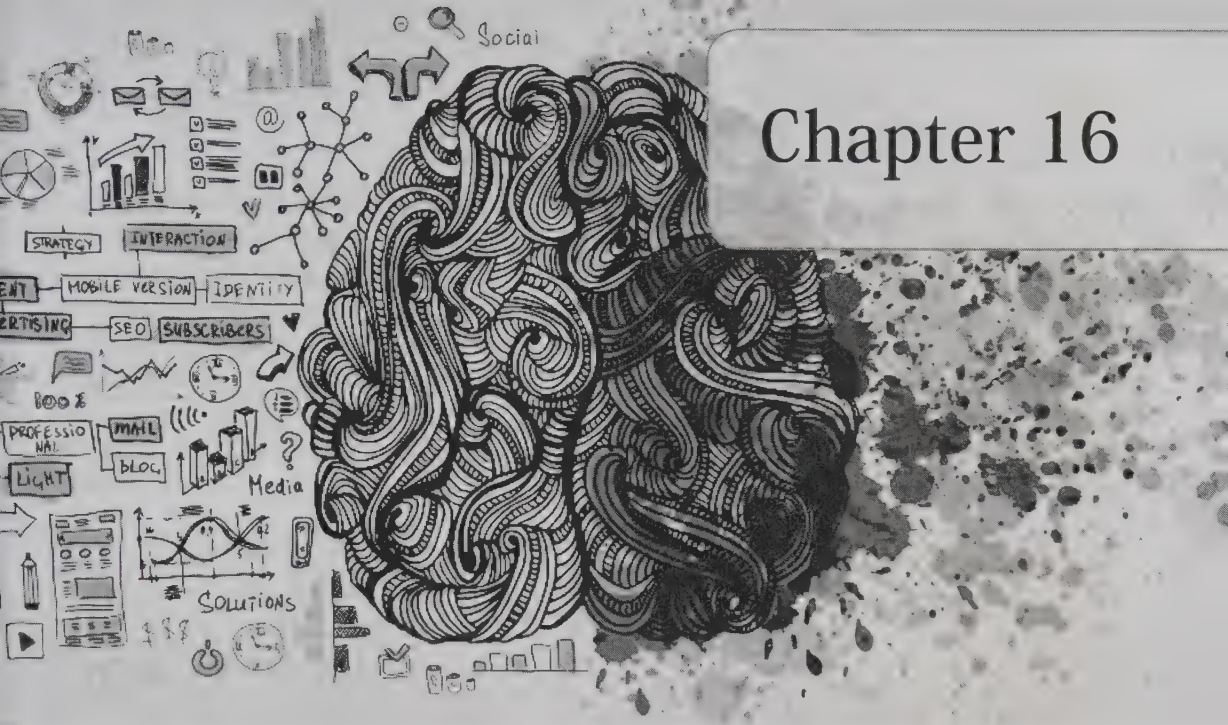
police proposal media editor conclusion insurance football presentation effort
passion

obligation employer depression assistance inflation running emotion preference
equipment

1. Conjoin two of these that strike you as having something in common. Write them out: _____ and _____. State the reason, in writing, that you saw these two as having something in common. (You can use the terms you worked with in the analogy exercises, but you don't have to; it might be fun to work with different ones.)
2. Make a list of other concepts (sub-concepts) that make up these two concepts. This means two lists. It's a matter of considering the field of connotation that contributes to these *as broad conceptions*. Be generous and inclusive.
3. Distill each of the two lists to the most essential core concepts that are absolutely needed to understand each of your two concepts (you are training them). This provides two smaller lists.



4. Name with upper-case letters the sub-concepts that are part of the essential core of each of the two concepts you chose in #1. So you have two lists of letters grouped under two names of concepts.
5. Conjoin the letters using the symbol for “and,” the dot. Place parentheses around each of the two groups and conjoin the groups with the “and” symbol. Now set aside the two concepts you started with and just think about the core elements of each in conjunction with one another. State whether there is any confirmation for your decision to put them together in #1, when I said select two that have something in common. Does the commonality come out explicitly when you think about the essential core of those two concepts? Yes or no. If yes, explain the confirmation in a sentence or two. If not, would it be more important to disjoin these two concepts you started with, for most purposes? Yes or no, and why, in a sentence or two.
6. Disjoin the same two elements you conjoined in #1. _____ or _____. Now make a schema and name with upper-case letters all of the sub-concepts *you did not include* as belonging to the essential core of these two concepts. This means making another two lists of letters. Don’t use the same letters you used in #4.
7. Place each group from these new lists in parentheses and disjoin the two groups. Is there any overlap or interesting crossing over in the two disjoined groups, or are they really quite different? Explain your judgment in a sentence or two.
8. Take the first group of core elements you placed in parentheses in #5 and disjoin it with the first group from #7, and then do the same for the second group from #5 and #7. You now have a complex formalism (an overall conjunction of two disjoined lists) that may suggest why you chose the two nouns you chose in #1. And it may not. If it does confirm your choice, write two sentences about why you think your formalization process *showed* that commonality. If your choice is not confirmed in the analysis, explain why your statement in #1 is excluded by this kind of analysis.



Chapter 16

ARGUMENTS

Freshman Composition

You have learned a lot about how to catch yourself in the midst of thinking, to slow it down, name it, create classes and concepts, name and symbolize elements, make elements into terms by making them visible via relations, move them around in relation to one another, limit the terms by choosing a purpose, line them up, and hook them together. If you actually practice the things you've learned so far, your active thinking will be increasingly under your control. As a result, the values you choose, in reflecting on your life, can come to be those that are in your mind, your active expression, and your power of understanding others. You will now have a power you didn't have before, in thinking, in understanding/judging/interpreting, and in bringing your own thoughts to words, written and spoken.



That much, in and of itself, might justify learning as much logic as you have learned. But that is not where the value of logic ends. To take the next step we must explore “arguments.” It’s not a very good name. It conjures images of people yelling and not listening. I don’t have a better name for it, so we’ll have to live with this and just say: “we mean the very opposite of yelling and screaming.” To provide a *good* argument, reflecting on your own purposes, listening to what others have said, interpreting it rightly, and learning as much as you can about what is known about your topic, and carefully formulating your thoughts *as reasons* are the most important things.

You’ll remember that when your English teacher taught you to write an essay, you had to have a “thesis.” You were probably told that meant a clear statement of your main idea. That is a perfectly good way to define the idea of a thesis, but now that you really know what an *idea* is (that is, the source of infinitely many conceptions on a topic), and you’ll want to go further than *stating* an idea. You must explore your own conception of the idea, and those conceptions held by others. Remember that any conception can be refined into many different concepts. But don’t be too quick to do that. You may miss something. Think about it.

For writing an essay in freshman composition it is usually enough to have an idea and say some things about it that hang together. But later in the year, they made you write a *persuasive* essay. Then your thesis needed to be a statement that was *debatable*, that not everyone would agree with, and you had to “make a case” for it. This comes closer to being an “argument” in the sense we use the word in logic and in the formal study of persuasion.

But we don’t defend a “thesis” in logic, we defend a “conclusion.” A conclusion differs from a thesis in that it isn’t just a statement of the main idea, it is a formal proposition, with a subject, predicate, and copula. And it has been regimented, supplied with a substantive expansion, to fit other formal propositions which will eventually be given as reasons for *inferring* the conclusion and, in some sense *accepting* that conclusion (which is still short of *acting* on it).

Your Honor, May I Approach the Bench?

In a sense, this is what lawyers do when they argue a case in court. They try to arrange the evidence in such a way as to persuade a judge or a jury that one party or the other is or isn’t at fault for some past events. But these arguments are always about the past (*our* arguments won’t always be) and they are “dialectical,” as philosophers say. That means that they go back and forth between and among lawyers and witnesses and even the judge can ask questions so that the case gets examined from at least two points of view, and maybe more.

Since *our* arguments are not always about the past, we don’t use “evidence” (in

the legal sense) in logic, we use *reasons*. Evidence is just one kind of reason, but there are many other kinds of reasons for inferring or accepting a proposition. **The argument itself, taken as a whole, is one kind of reason.** Still, everything from a hunch to a suspicion, to a premonition, to an expectation, to a projection of past experience, to an analogical parallel, and even lucky errors might give us reasons to infer and accept a proposition.

Eureka!

When we make hypotheses in science and then contrive experiments to test them, we formulate the hypothesis as a provisional conclusion. Our aim is sometimes to confirm the hypothesis, but that gets us nowhere unless we can also eliminate competing hypotheses that are contrary to our favored hypothesis. But scientific reasoning creates only one kind of argument: arguments aimed at gaining scientific knowledge. There are many kinds of knowledge that are not scientific, and many kinds of arguments that do not aim to create knowledge at all.

Archimedes, the famous ancient Greek scientist, supposedly shouted “Eureka!” when he had the insight into the principle of displacement of water according to volume. That means “I found it” in Greek, I am told. Wikipedia says it is the first person singular perfect indicative active of a verb for finding something. That is a very fine thing. It is also a sort of conclusion, but not exactly a logical one. We discussed some time back how scientific thinking is based on metaphors and especially the metonymy of cause and effect. There is a special logic of science and scientific reasoning, but it is more specific than the general logic we are studying. One cannot safely generalize the logic of science to arrive at the principles of logic. People have tried, but it’s a tenuous pathway; science is narrow, logic is broad. *But* one can safely specify the general principles of logic (the norms of good thinking) into scientific contexts. Learn logic first. Then scientific reasoning. You’ll make fewer mistakes.

In logic, we want to understand *every* kind of argument and *all* the types of inference and acceptance that have a bearing on our lives, both in our actions and in our thinking. That means that instead of studying actual arguments, we study *argument forms*. It includes scientific arguments, but they are only one group of examples we might offer. To learn to think well, it is not enough to learn to think scientifically.

Tuesday Night with Friends

Returning to everyday life, then, we can find more straight forward examples. Let’s say my friend Penny wants to go to the movies. Howard wants to go to the pub. The rest of us are unsure. Penny says the movie has been nominated for six



Oscars, including Best Picture. Howard says the pub's stout beer has just been awarded an international medal. Penny says that Brad Pitt is in the movie (scoring some points with some members of our group, losing others –a calculated risk). Howard says we could talk at the pub but not at the movie. Some want to talk, some want to drool over Brad Pitt. Some want to talk *while* they drool over Brad Pitt, *with* an excellent beer. (Remember conjunctions and disjunctions?) Houston, we have a problem, since we have class tomorrow and need to be home by 10:00, and, maybe Howard adds, for the sake of the poorer friends, the movie theater charges \$10 for a non-excellent beer.

Rather than looking directly at whether we should go to the movies or to the pub, when we do the logic of this, we try to look at the forms we might use to *understand* the argument. That will put us in charge of everything any of our friends might say, and from there we can choose how to navigate the discussion. We have two arguments here, and due to the 10:00 PM limitation, they are functionally contraries: on the face of it, we cannot do both, although we might do neither one (remember Mr. Square). We also assume, for now, that everyone must do the same thing to keep our group together, but clearly that is negotiable too. Welcome to the barn we call "Tuesday Night with Friends."

Let's look at the assertions of Penny and Howard to see what sorts of propositions they make. It has taken the overall form of a disjunction of contraries: Movies or Pub ($M \vee P$), and this is a fairly stark disjunction in this case. It is not absolute exclusion, because we could (one supposes) drink expensive non-excellent beer and also see the movie. Or we could sit in the pub, read reviews of the movie to each other from our phones, drink excellent, affordable beer, and talk about Brad Pitt. There is almost always middle ground, in the real world. But let's do the logic anyway, shall we?

There will be two arguments, and the conclusion of one is M (movies). The conclusion of the other is P (pub). So, loosely, here is a serial predication you should quickly grasp:

- C. M $is_{10} P$
 3. BP $is_i M$
 2. 6O $is_i BP$
 1. M $is_i 6O$

You may notice that our stuffing of "6 Oscars" into "Brad Pitt" (while perhaps Jennifer Anniston might like to try that) is not quite the same as stuffing "oak trees" in to "plants" or "logs" into "bumps," to recur to earlier examples, but the point is not what "fits" into what, but what meanings are dragged along as we think. Not much else is new here except that I have used the subscript i to mean "includes." You learned stuffing. Stuffing your last denotation into the predicate and treating

both together as a *new* denotation is what you learned to do in forming concepts. Now we have generalized that process into *inclusion*, and you now know that conjunction is a kind of inclusion. We have stuffed six Oscar nominations *and* Brad Pitt into the movie, and then we have concluded (the “C” line, for “conclusion”) our series by suggesting the action (is_{10}) of going to the movie *excludes* the pub.

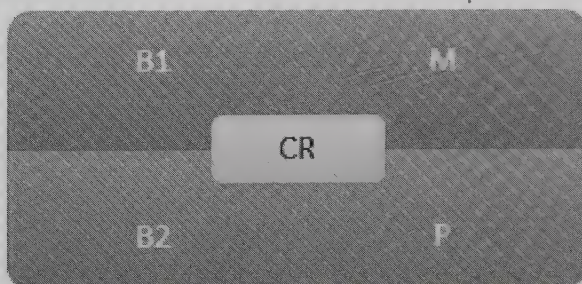
Geez that is lovely, isn’t it? Since you’re able to guess the meaning of the letters I chose, I won’t bother to write out the schema. We didn’t have to do it just this way, of course. I chose a negative conclusion to spur my group to reflection. I could have stopped with just asserting $M - Us_{10}$ Movie. That is a circle, formally saying “we should go to the movie because it’s the movie we should go to.” All formal logic is circular in that formal sense. But its *meaning* is not circular, since Brad and the six got stuffed, and not something else. (And after all, we might have stuffed many other things in there.)

I also chose to talk about the movie as the main subject when I could have talked about our group (and what it should do) as the main subject term. These choices are tactical, made for persuasive rather than strictly logical purposes. Clearly, I want to go to the movie (I agree with Penny). If I wanted to go to the pub, that would have been my first subject, and the argument would end with excluding the movie. I could also add more reasons for either conclusion, or even suggest that we do some third thing, like going skating.

But now I want you to write out the schema for the *pub* argument, as a serial predication. This is the other side of the disjunction. Go ahead. I’ll wait.

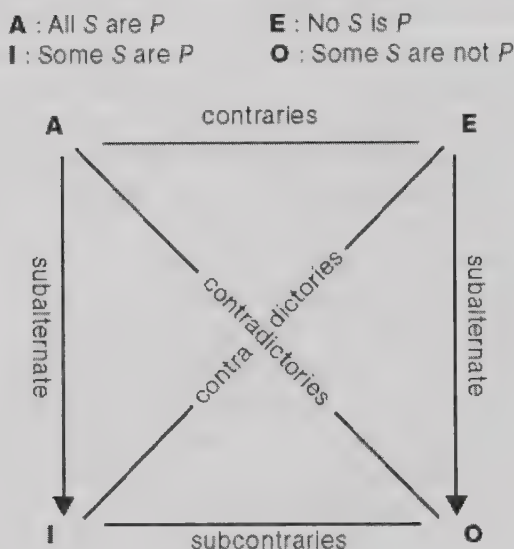
Dum-de--dum. La-de-da. Hmmm, wonder what’s for dinner. Dum-de . . . Hey is that a bird over there? Nah, just a loose branch in the breeze.

Are you done? I hope so. I’m getting hungry. Anyway, so you have two conclusions, mine and yours, right? I have an idea. Why don’t you reflect on both of them? Together. Now generalize. (always the hard part.) Hint: It’s not just the Tuesday Night with Friends problem, is it? It’s like, every night. And why? I suggest you set these two terms, M and P, as the analogates of an analogy.





Now, stuff all your serial propositions into the base terms, using a symbol of your choice. The letters you choose represent the Brad Pitt-6 Oscars nexus, and whatever two reasons you gave for the pub, maybe Affordable and Good beer? Ah, I feel the Central Relation of an analogy emerging from the depths. Its superficial expression is Tuesday Night with Friends, TNwF. But generalized to include every night, "All N is . . . what?" What shall we say? Let's go to Mr. Square.



We already said that M and P are contraries, but to generalize, we must treat M and P as one subject term. What do M and P have in common? Think about it, really. I am asking for a (charitable and applicable) substantive expansion. You really need to do this yourself (and you *will* in the exercises for this chapter). Look at Aristotle's ten senses of "is." Yes, M and P are both "things," but we can do better than that.

They are *places* we might go, right? But not at the same time, i.e., not just Tuesday night, but *any* night when our time is limited. And it's not just the Brad Pitt movie, but any movie (unless they start showing them in the back room of the pub, and we can talk through the showing). Work with me here. What is our problem, really?

We can see that "All nights are nights when we have to . . . what?"

How about "be one place at a time"? All N is₄ p¹. There is your A-proposition. It looks pretty fair to use the universal quantifier when it is stated this way. Unless you can work out a way to be more than one place at the same time, which makes you smarter than a super hero.

Thus, the contradiction is the O-proposition, “some N is not p^1 .” It’s science fiction to hold both, right? Every night you have to be in one place at a time, but some nights you don’t? Only in storyland (see Stephen King’s novel *The Outsider*, it’s all about this; kinda gruesome though). And our A-proposition *includes* our I-proposition (sub-alternation), “some N is p^1 ,” but it’s not a very interesting inclusion, until you realize that tonight, Tuesday, is actually best described by the I-proposition, since Tuesday (tonight) is not *every* night but is *some* night, since we could gather the same group tomorrow night or the next. That is the only reason the O-proposition is in contradiction, because tonight is in fact *some* (singular) night. It disagrees in the quantity of the subject term, as well as the quality of the predicate term (negative rather than affirmative). We may be getting somewhere.

I have left off the E-proposition until now for a reason. That proposition barely makes sense until you grasp the central relation of the analogy. No N is p_1 ? What does that even mean? But Mr. Square has been a great help. With Tuesday night generalized to “any given night” and re-specified as an I-proposition (some night), we may look at *its* relation to the O-proposition. They cannot both be false (sub-contraries, I and O).

Why? Because everything that is individual is somewhere, so if it’s not at the movies, it must be somewhere else. Do you have any particular place in mind, Randy? (Remember the poker game.) Umm, yes, my observation *included* . . . the pub. And, on the other side, if we’re not at the pub, we must be somewhere else. Perhaps *you* have the movies in mind? It’s the same piece of reasoning we did several times before, and that I said was the best kind, the most creative kind of reasoning. If you *know* your A-proposition, you can start *reasoning* with the corresponding O-proposition, and work your way around the square

Are we getting anywhere yet on that Central Relation of the analogy? We placed M and P as the analogates. The base terms are now: B1 = Night¹. And B2 = any other Night except N¹. Note that it isn’t just the flat negation of Night¹: It has to be some other real individual night to bear the meaning, but it doesn’t matter which one (except that it will need to be in the future so it can still be acted upon, so we could call it N^f –remember, we are making up the symbols in a way that we can remember them).

May I suggest that lurking beneath our Tuesday night problem is the following proposition: everything is somewhere *and* nothing can be more than one place at a time. This statement consists of an A-proposition and a different E-proposition. Let’s call the CR emerging in our analogy: “spatio-temporal location.” That seems like an awfully fancy name for our Tuesday night problem, I know, but consider this: if not for the spatio-temporal location limit, we wouldn’t *have* a Tuesday night problem.



So now our E-proposition makes sense. It essentially says “nothing can be in two places at the same time,” or $\text{No } s \text{ is}_1 p^{>1}$. We can modify our A-proposition and E-propositions now: “All $s \text{ is}_1 p^{11}$ ” and “No $s \text{ is}_1 p^{11}$ ” and these are the contraries we were really stuck on. The exclamation point is a way of saying “one and only one, in the real world!” in this case. It is called a “shriek” by some logicians. You can use it to say that the individual you are naming with your concept is a unique individual in the real world. Note that we also used is_1 . Using the is_1 means “is” in the most universal sense, that, is “substance.”

Now, I know what you are thinking: “I don’t need you to tell me that our problem is that we can’t be two places at the same time. That is freaking obvious, dude.” I know that, and I know that you know it. But dude, this is an *example*, and sometimes it *isn’t* obvious what the problem really is until you actually *do* the thinking. It won’t always be as obvious as this example. And even if it is sort of assumed that we all know what the general problem is (spatio-temporal location in this case), that doesn’t mean it’s *equally* obvious to everyone involved. Further, just *stating* the obvious sometimes leads to a softening of the tension. So, I say to Howard and Penny “nobody can be in two places at once” (E-proposition). And no sooner have I said it, and there is the negation of it in the minds of those listening (A-proposition, the contrary, and I-proposition, the contradictory) hovering around and helping to define what I mean. (Remember Nixon’s “I am not a crook.”) Everyone thinks: so, how could we do both? Then I think “do you have something *in particular* in mind,” that is, *not* the universal, affirmative or negative.

Therefore: If we just make an effort to press the universal quantifiers downwards into the existential quantifiers, alternatives begin to appear. Movie tomorrow night, pub tonight? True, *maybe* we can’t do both, but what are y’all doing tomorrow night? Maybe the movie is over at 9:00 and we can have one beer at the pub, or maybe 10:00 isn’t an absolute deadline? What about 10:15? I know, don’t press it. You have logic homework due tomorrow.

Conclusions

The example is banal, but it captures real thinking that happens so fast you don’t see its structure. What we have done here is think through the relevant relations and their conditions. We have compared and contrasted, and we got down to brass tacks about what was asserted by Howard and Penny. We compared two arguments, taken whole, disjoined them, and recognized some assumptions about their *conclusions* (movie or pub): they were different and difficult to reconcile at first. Then we worked with them until some give, some softness appeared in the tension. It is extremely rare that a problem cannot be solved in the real world. We compared and contrasted conclusions and the way they carried whole arguments stuffed into their cargo hold.

But what we really *haven't* done was assess the *reasons* given for each conclusion. It is unwise (and quickly it gets chaotic) to compare and contrast reasons *across* two or more arguments, where they are reasons for inferring and accepting *different* conclusions (especially conclusions that are in tension with one another). Even if we use the "same" reason to support two different conclusions, our conclusions *determine* their supporting reasons to such an extent that it really *isn't* the "same" reason (even if it's the same words) when it sits in two different arguments.

We have started with the conclusion because that is how you can know and express your purpose. It is your conclusion that *serves* the purpose. (So, choose it wisely and carefully.) The conclusion contains the words and meanings you want to assert, which means you want action from others on *these* meanings. The *reasons* for the conclusion can change with context and circumstance, but the conclusion is the important choice.

Yet, almost every conclusion stands in opposition to some alternative conclusion, and, taken as an assertion, that alternative means *not* acting on the first conclusion. If there is no alternative, there is no point in making an argument. No sooner have you asserted your conclusion than the alternatives begin to appear, hovering around your assertion and reminding everyone that "or not" is an option. Sometimes it is better not to state the conclusion *as an assertion*, instead allowing people to formulate it themselves, in their thinking. If your reasons are clear, you might not have to assert your conclusion explicitly, but you *do* have to know what it is.

So we have learned that when we make an *argument*, **we begin with our conclusion and we must compare it to and contrast it with the alternatives—other conclusions that are in some kind of tension with our own.** The tools we have learned so far are very useful for thinking about this part, but these tools will do far more than just that. Still, if we don't *see* the possibilities and limitations of our conclusion, we haven't got enough context to make good arguments. By learning what we have stuffed into our final term, we see our own thinking process as a matter of turning our conclusion into a clear assertion, and, we hope, also persuasive. We know exactly what we are including. We also have some sense of where our conclusion has some "give" in it.

The complete, flat negation of our conclusion is rarely interesting: "anything but C." If we are debating whether to go to the movies or the pub, and our friend Sheldon suggests that we do nothing at all, we stare blankly at him. C'mon Shel. An alternative which is the simple negation of whatever our conclusion is, is not a counter-argument. It is no argument at all. Any two-year old can do it. That's why we spend so much time with our conclusion before formulating the reasons and trying to understand how they prompt us to inferences and acceptances. To defend your conclusion from alternatives, you must anticipate the alternatives.

If this process is reminding you of the dialogue of a popular and long-running TV show, it should. That show often uses these techniques to create its dialogue. Here's an example:



<https://url.ryanbooks.com/ds880>

It's all on the Mr. Square.

Other People's Conclusions

A moment ago, I mentioned that sometimes you might choose not to assert your conclusion but to let it be formulated by others in their thinking. This is actually a technique in rhetoric, in persuasion, that is inappropriate in logic. While doing your own logical analysis, you will always want to be as explicit as possible about your conclusion and your reasons. But working in the real world, you may have to figure out what other people's conclusions are. There are some techniques for doing that.

First, a couple of cautionary notes. As you have seen, a conclusion may be unstated. So you must examine your own thinking to see where you are being led in considering the reasons being offered by someone else. Second, the conclusion, where it is explicitly asserted, can come anywhere in the course of an argument. It can be the first thing said, the last thing said, or it may be said at any other point along the way. In logic, we usually list it at the end. In competitive debate it is always stated at the beginning, as a proposition to be affirmed or denied. But in the real world, it can come anywhere.

There are indicator words that may help you find someone else's conclusion, and you can use them in asserting your own conclusion so that others will be able to understand clearly what you want them to act on. Here are some of the words:

- Indicator words:
 - obviously
 - certainly
 - there is no question that
 - of course
 - surely
 - it is clear that
 - undoubtedly, then
 - we can see, then
 - we will only say that
 - anyone must see that



- at the end of the day
- it all comes down to
- when all is said and done
- to sum up, then

Unfortunately, some of these words can be used to introduce reasons for a conclusion, and identifying conclusions is an art, not a science. Sometimes it just isn't clear and you have to consider the whole argument. Generally, all the reasons taken together will, if it is a good argument, point to one of the propositions, but within an argument there can be reasons for some of the reasons, making the latter "sub-conclusions" on the road to an overall conclusion. It is a good idea, then, to list every reason offered in an argument as a declarative sentence, and then to examine them together to see which reasons are closely related to which other reasons, and which reason comes closest to taking in all of them. That will be the best candidate for a conclusion.

To make the case for your conclusion, as well as to understand someone else's argument, you must also consider the alternatives to the conclusion, and the way that a conclusion can be softened and negotiated. If there is any "give" in a conclusion, relative to the alternatives, someone will definitely start to press on those soft points. This isn't enough, though.

In your argument, you must balance your choice of reasons in light of all of these factors before *giving* the reasons. If you do not do the hard work on your conclusion, you have only luck to secure the relationship between your *premises* (your reasons) and your conclusion. Now there is a (somewhat) new word: "premise." Let's talk about it.

Premises

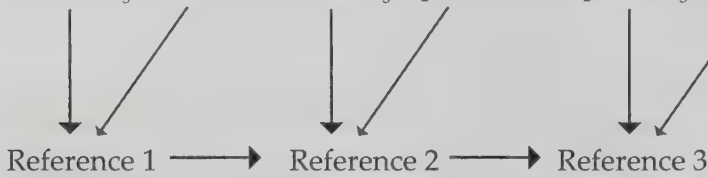
In logic, your reasons for inferring and/or accepting a conclusion are called "premises." We don't call them premises *until* we formalize the whole argument. They're just reasons to begin with, candidates for *becoming* premises. You'll not be giving every reason you can think of for your conclusion. Rather, you want the best group, which means judging among the various reasons and promoting only one closely related group to the status of premises.

Back when we were looking at how to combine propositions in a serial predication, we also saw that there are certain rules for combining them that we needed to follow. We will get very specific about these rules later, but right now the point is that *when* we formalize our reasons as declarative sentences, and then as propositions, *and* when we have examined their connotations and denotations, *and* named the references, *and* then selected those references that lead seamlessly from one subject to the next predicate, *and* then we stuffed them, we saw that there



was a series of “references” that we listed along the bottom. Remember this?

An oak is₅ a tree, and a tree is₅ a plant, and a plant is₅ an organism.



Those references are the “named beasts,” the root meaning of each of the propositions, but now lined up in order. Remember how the Charlie Sheen example, and all of the Direct TV ads, wandered into added predicates that were too specific for the context, growing increasingly implausible, as reasons for dumping cable and getting Direct TV. Here is a reminder:

Key

Terms:

Y = You not recording your shows (S1)

U = Unhappy, feeling (P1)

H = Happy Hour, going to (P2)

A = Anything, up for (P3)

T = Turkish Bath, going to (P4)

C = Charlie Sheen, meeting (P5)

P = Scenes from Platoon, re-enacting (P6)

Relations

f = to feel

g = to go

u = to be up for

m = to meet

r = to re-enact

Now we say:

7. ~rP
6. C r P
5. T m C
4. A g T
3. H u A
2. U g H
1. Y f U



Now that you know more about relations and concepts and (visible) terms, this should be clearer than it was before. You see all the relations are forms of conjunction, right? Well, what made the commercials funny was that the *inferences* were so very “loose.” What we want in a good argument is something “tight.” Tight relations among premises would mean very few alternatives, and the Direct TV ads, with each predication, left more and more alternatives aside. And yet, each *added* (conjoined) a new predicate, each of which *did* succeed in offering a *reason* for the conclusion. Not much of a reason, for sure. The best reason was always the first predicate in the series: with Direct TV you can record your shows. Get direct TV. A conclusion, no?

Still, in thinking about that series of “beasts,” those connected references, that lay beneath our process of thinking, we begin to struggle with the real reasons people *infer* from one proposition to another. It is a **movement of thinking, and it includes emotions and intuitions, but most importantly, it has a sort of momentum that is either maintained, or it builds, or it slows and eventually fails.** In the best arguments, “tight” ones, the flow of references is experienced as seamless. In bad arguments, “loose” ones, the flow of thinking is interrupted and the mind is thrown into reflection. In very bad arguments, the flow of active thinking is entirely arrested and the listener or reader can no longer follow the flow of the reasoning at all. It is functionally false, a failed assertion. (Remember that?)

Negations interrupt. It is difficult to think *past* them unless they are submerged –like saying “unhappy” instead of “not happy,” for example. People will think of being “unhappy” as its own state or condition, but we call attention to the negativity when we say “not happy,” and people assume or infer that we are speaking of someone who would otherwise *be* happy but now is *not*. It is a much more complex thought. It requires a pause.

There are many ways to bundle negations into our terms and propositions to make them feel like individual constructive thoughts instead of complexes of a positive thought and its negation. Because they interrupt active thinking, negative premises (E- and O-propositions) are to be avoided in our premises, when that is possible. When we don’t follow this rule in forming premises, attention is attracted to whatever is *being negated*, and then everyone begins to entertain questions: are you negating just the subject, just the predicate, or the whole combination of subject and predicate?

So a “tight” argument is one that comes as close to being seamless as possible, in the relations among premises and conclusion. Aristotle (remember him?) said there are some *argument forms* that can be “thought” in a single act, and other argument forms that can hardly be thought at all. *How* you express the reasons, as premises, is often as important as what they include or “imply.”



“Implications” are what clear thinking people *ought to infer* from your premises, but that doesn’t mean they will do it. Taking the right implications from a collection of premises requires mental work, especially if the meaning is less than fully obvious. We will discuss what makes an argument *formally* good in the next chapter, but for now we are concerned with something much more important, which is how others *follow* your argument.

Attracting Followers

We have been looking at arguments as collections of ordered reasons called premises, and these lead to a conclusion. The order in which those premises are expressed can make a very great difference to the success or failure of the conclusion, in terms of its persuasiveness, when the conclusion is understood as an assertion that people are expected to act on (the purpose of the argument). What is needed for this result is that people *follow* the argument, and also **accept** what *follows from* the argument. We order premises in logic not for persuasive effect, but for clarity, to expose the logical structure of the argument. Then and only then do we consider how we might increase the persuasiveness of the argument without sacrificing too much of the clarity that enables people to follow it.

In order to insure that others follow the argument, it needs to be simple, clear, tight, parsimonious, and cogent. When it possesses all of these characteristics, we say the argument is “elegant.” Logical elegance is different from rhetorical “eloquence.” Eloquence means saying what is most appropriate on any given occasion, and saying it in the most effective way, from among all the choices. One can be eloquent without seeking to persuade anyone of anything. An eloquent speech may praise the occasion, praise the host, praise a person, celebrate an anniversary or a wedding, eulogize a life, and many other things that really do not require persuasion. Prudence, wisdom, decorum, and many other considerations bear upon eloquence.

Elegance in argumentation is rarely eloquent, because decorated speech that uses emotion as an end in itself, whether satisfaction, grief, joy, solemnity, or any other important emotion that a speech may inspire, is irrelevant to the norms and virtues of elegance in argumentation. Once in a great while, simplicity or clarity, for instance, might be so important for an occasion, that elegance can serve the aim of achieving eloquence, but usually we dispense with eloquence in logic. We do use emotion and intuition in making our argument, because nothing much happens in our mental life without the aid of emotion and feeling in general. Even perceiving the argument is a kind of feeling it. You feel me? No? (See how I closed down that thinking process?)

The word “follow” in “following an argument” means perceiving the movement of the reasoning, and seeing how the premises relate to each other, and also how

they would add up to the conclusion, when taken together. Keeping the premises affirmative (no negations), seamless as an accumulation of (well-stuffed) terms, and making sure that every term is as determinate, as a concept, as possible: This is **clarity**. The transformation of a connotative field into a denotation, that process of making the field, which is a conception, into a concept, must be done “without remainder,” **tightly** and not loosely, as we discussed above. Add, now, that this is what **simplicity** in thinking comes down to: transformations of conceptions into concepts (predicates into subjects) that are well-trained. That process is never perfect, but it can be better or worse. Predicates are broad and vague, as is their function. Subjects are narrow and determinate so that everyone knows exactly what is being talked about, and what isn’t. Simplicity is achieved by contextually relevant narrowing and determining. Call it “simplification” or even “reduction” if you like.

I like to cook. I remember the first time I heard someone talk about a “reduction” sauce, I paused and thought “what?” They meant reduce the amount of water in the mixture. It concentrates the flavors and intensifies them. That is very much what you are doing when you simplify well. It’s a reduction sauce of a predicate into a mentally edible subject. It requires a process.

Parsimony is a new word for us. It means that there is nothing included in the premises except what really must be there, and what really must be there is there. There should be no extra information because that distracts us from the flow proceeding from premise to premise, and from the premises taken together as justification for *accepting* the conclusion. The principle often stated in our inductive reasoning (when we try to decide what argument is the best) is *ceteris paribus* the simplest explanation is most likely to be true. In our terms, all other things being equal, as regards context, simplicity points to parsimony, so leave out anything that doesn’t contribute in a vital way to the conclusion. But parsimony is not the same thing as simplicity because simplification may be overdone or underdone, and either failure is a failure of parsimony.

Cogency is also a new word. It means that when we take the argument as a whole, it hangs together. This has two aspects. The first is that the premises really do lead us successfully down a path of reasoning, by means of our inferences. The second is that the cumulative weight of the premises, taken together and in the order expressed, *includes* the conclusion. This is a new kind of inclusion, one we haven’t yet examined. It’s called “intensive inclusion.” We’ll talk about more eventually. When I say your argument is cogent, I don’t mean I agree with your conclusion, I mean that if I look at your argument hypothetically, as a whole, it hangs together.

When we have done all in our power to achieve elegance, people will follow our argument. They are in a position to accept it. If they do not follow it, they should not accept the argument. To accept an argument does not mean that we are prepared to act on the conclusion. It means that we have been able to make the inferences

required, and that we have interpreted and judged the argument as having weight in relation to its purpose. Making your argument elegant is the most you can do, logically, to get it accepted.

Inelegant arguments can be accepted using the principle of **charity** we learned some time ago. What that means is that we choose to ignore the aspects of the argument that fall short of full elegance (it may be loose or baroque or lack cogency), and do our best to improve the argument using our own powers of reason. We then see the conclusion in light of the effort we bring to the mutual chore of good communication.

There is no crime in accepting an argument that is less elegant than it could be, but where arguments lack simplicity, clarity, tightness, and parsimony, the one who makes that argument has less right to expect others to accept it. The cumulative effect of an argument is that those who read or hear it make the inferences *intended* and come to rest *only* at the conclusion. Seeing the whole of what they have heard together, they recognize its cogency. In such cases, your auditors or readers *ought* to accept your argument, even if they remain unconvinced of the conclusion.

If . . . then

There is a very special relationship between the premises, taken as a whole, and the conclusion of an argument. The premises, together, *imply* the conclusion. Implication came up above. It is a special kind of inclusion, as I said. Some logic books make a big deal out of implication, and in fact you do need the idea of implication to do logic. Its main meaning has to do with this special kind of inclusion. This is **“intensive” inclusion, where it is the culmination of inferences.** Until the early 20th century everyone who studied logic studied intensive inclusion, but then a fairly major change occurred –leading to some nasty disputes that were not logical arguments. We are going to overcome all that 20th century nastiness in this book. Just be glad it’s over.

Implication really means “what you *ought* to infer.” It is a norm for thinking, not a neutral or wholly objective operation. But it *is* objective, in the truest sense, meaning *anyone* ought to be able to infer the same thing from the same premises. The implications are what they are, regardless of whether a given person follows or does not follow the reasoning. When we have an elegant argument, most people will infer the same things, and the implication of the premises taken together, *should be* nothing less and nothing more than the conclusion you chose. The conclusion is already there, intensively included in (and also implied by) the premises.

How? In short, the premises are conjoined (there is an “and” between each proposition that is used as a premise). Cumulatively, they include the conclusion: Premise (1) *and* Premise (2) *and* Premise (3) . . . includes the conclusion intensively.

Therefore, the conclusion is *implied* by the premises and you *ought* to infer it. That why I made the argument, my purpose. If time is important to my purpose, as with a recipe, the order of the premises may be important. It is appropriate to think of this kind of inclusion on the analogy of a recipe. Some of the propositions are ingredients, some are actions, some involve equipment, but the conclusion is the cake. The cake is intensively included in the propositions taken as premises.

Your argument that we ought to vote for a given political candidate is, intensively, the same as a recipe. If it is a good argument, the implication is there and we ought to infer the conclusion you chose. That does not mean you have our vote, but there is certainly nothing wrong with your argument. The following of the argument, and your followers, have done what can be done logically. The world does not yield to elegant arguments, but it probably ought to more often than it does.

Elegant arguments can be made for conclusions that, when compared and contrasted, are **incompatible** (either contrary or contradictory). When that happens, we have a “paradox.” There is another word philosophy uses: “antinomy.” When we have antinomies, we have no choice but to resort to dialectical thinking, and I mentioned that that is what the lawyers do in court. Some important questions, like the existence of free will, or of God, or the soul, have led historically to antinomies: Perfectly good arguments that arrive at incompatible conclusions. We can *accept* all the arguments. That doesn’t mean we have decided to act on one conclusion.

There is a formal side to all this thinking. The operations, themselves, are driven by “and” “or” and “not” (if we dare to include a “not” in our reasoning). We see the premises as connected by “and” arriving at a conclusion which says, in effect, **if** we think of the premises, conjoined, **then** we should infer the conclusion. And then there is what a sharp person will see is *included* in the combinations and the reasons themselves. A dull one will not. The implication is the same either way.

The *inference* is the sign or marker that the implication (the intensive inclusion) has been *taken*, rightly interpreted. Implication is about being able to think well enough to draw the included conclusion(s) from the reasons given and the way they have been arranged. One can do this without formalizing the process through which one has passed, but when we seek to show, or “demonstrate” that we have succeeded in making the implied inference, certain extra rules for expression become relevant.

The world is often skeptical and cruel. In your life, you may be asked to show, frequently, that you really have understood an argument, and that means learning how to express intensive inclusion in ways that others can test. You can show you understand a conclusion by acting on it, of course, but action is only one kind of demonstration. There are other methods that are substitutes for acting. That is the topic of the next chapter.



EXERCISES

This is a lot of homework, but it's pretty important.

Scenario: You have a problem. Two of your best friends want to take a road trip to see a game in which your college or university is competing. Decide what sort of game it is and where, and list that. Two other friends want to have a house party and watch the same game on TV (it will be televised). Everyone wants to be together. Name your four friends in a list. They need to be real friends of yours, but you do not have to use their real names, so long as you can remember who is who. If you don't like sports, make it a concert or a play or a movie premier or a presidential debate. Whatever floats your boat.

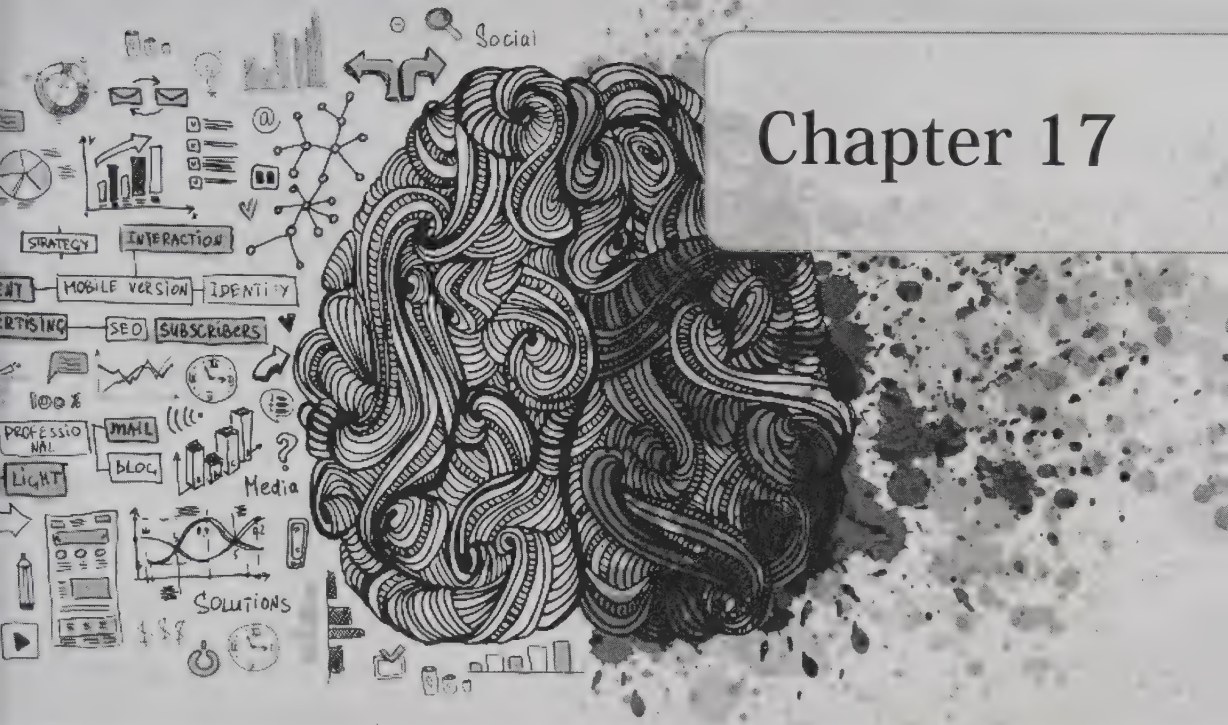
1. Formulate these two prospects as conclusions, with a subject term, predicate term and copula. Make a diagram showing the showing the denotation and connotation and name the reference of each.
2. Disjoin the two conclusions, putting each in parentheses and the "or" symbol between them. Below each conclusion, make a list of reasons you might choose to act on one conclusion or the other. List any reason you can think of. Some reasons, like "I want to be with all four of my friends," could appear on both lists.
3. Choose the best two reasons from your list. (This is a guess, at this point, but you can always go back and re-think the argument you will be making, if you decide later that a different reason will contribute more to the elegance of your argument, or if you can see that a reason you chose is blocking your effort to make an elegant argument.) List them. You have a total of four reasons, two for each conclusion.
4. Examine the reasons closely. Express each reason as a proposition (subject term, predicate term, and a relation –the relation does not have to be "is" at this point). Assign letters (upper case for terms, lower case for relations. Provide a schema so that others can interpret your operations. Looking at the connotations, consider what conceptions are involved in each reason, and how that might vary among each of the friends you named. Name the conceptions that the field of connotation suggests, and list the conceptions under the name of the friend(s) most likely to be possessed of that conception. (This is why they need to be real friends, people you know pretty well.)
5. In light of these reflections, consider what determinate concepts contribute best to the denotation of each reason (remember, we will want an argument that is clear, tight, simple, parsimonious, and cogent). You will have four lists of concepts under the four denotative terms.



6. Narrow the list of concepts to those forming the essential core by marking out the unnecessary concepts on the list from #5.
7. Looking at the references you named, line your up your two propositions for each argument as a first premise and a second premise. Choose the order of the premises by considering which reference leads most seamlessly to the next reference. You now have two serial predications ending with different conclusions. Finish the serial predication by adding the negation of the other conclusion to the end of each serial predication. When you express it in symbols, you'll see that what you have is a four-premise version of the Charlie Sheen argument above.
8. Are your arguments elegant? Consider whether they are simple, clear, tight, parsimonious, and cogent. Assess your two arguments in a short paragraph. Is one better than the other? If so rework the weaker one until they are equally elegant. Write your answers to these questions before doing #9 below: Will everyone follow each argument? Will they be able to make the inferences you intend in each case? Will they "accept" the argument (in the sense we have used)? By name, state which friend will choose which conclusion.
9. Go to each of your friends, in person or by phone, explain the scenario, but do not show them your work. Then present your finished argument, verbally, as if you just formulated it. Summarize what each friend says in a sentence or two, whether they follow, infer what is implied, and accept each argument. Then include whether they are ready to act on one conclusion or the other, and why.
10. Consider the subject terms of your two conclusions as the analogates in an analogy scheme. Come up with base terms that place them in comparison and contrast at the same time (these may be terms taken from your two chosen reasons, but you might want to refer back to your longer list of reasons to find some commonality). Consider also your friends' responses, taken together. Name a central relation that really comprises the whole exercise, and place it in the middle of your analogy schema.



CHAPTER 16



Chapter 17

VALIDITY

Write It Down

We learned how to create arguments and we learned how they are *experienced*, in our thinking and through the responses of others. All along we have been tracking your inner *experience* of thinking. After all, if you are going to get better at thinking, you have to become aware of what you must practice. The vast majority of our thinking is carried out silently, more or less. We think before we speak, for the most part. (And usually that's a good thing.)

But when we get too many moving parts, we all begin to *externalize* those parts so that we can look at them. When someone asks you to do some math, you may reach the limit of what you can “do in your head,” and then what happens? You reach for a piece of paper and a pencil, or for your phone’s calculator. It comes to the same thing, however you do it. You need to set it down to keep track.



What you are doing is setting down external markers to *hold* a thought in place while you think of something else. You know very well that you can pile up the markers and begin to perform operations on them, following certain rules. You can add in your head of course, but if I spew out seven different figures in rapid succession, not many of us can add them as we go. We set them down *and then* add them. We learned the rules for adding long ago. Same for other basic arithmetical operations.

But it may not have occurred to you that the *way* you write something down can either help or hinder your process. Please carry out the following multiplication operation:

XLII
x XVIII

Go ahead. I'll wait. . .

Yeah, that's what I thought. But if we write it with "42" and "18," you can do the operation. If we only consider what is *internal* to your thinking, it seems like it shouldn't matter about the notation you use, since the answer *is the same concept* whether you express it in Roman numerals or Arabic numerals: 756 or DCCLVI. But there is a very close relationship between your thinking patterns and the forms of external expression you have learned, including what language you speak. We study that relationship when we study *validity*.

Notation

I mentioned way back that the philosopher with the funny name "Quine" said that the notation system actually determines what we can and can't really think about. I'm not sure that's entirely right, but I don't think it's entirely wrong. In creating our symbols, up to now in this book, we have been really free-handed and we only wanted to use symbols we could remember easily. We have used some of the symbols that logicians like to use, but they don't all agree on the best set of symbols. But we have used some symbols that don't show up in other logic books. We are going to borrow some stuff from Professor Quine (RIP) in this chapter because he thought a lot about notation, so he got good at it.

The process of *creating* the symbols is very important to learning to think well. You must never assume that the symbols you are using at any given time are the *only* ones that can be devised to express the thoughts. In fact, we can almost always do better if we keep working on our symbols, and especially on our notation.

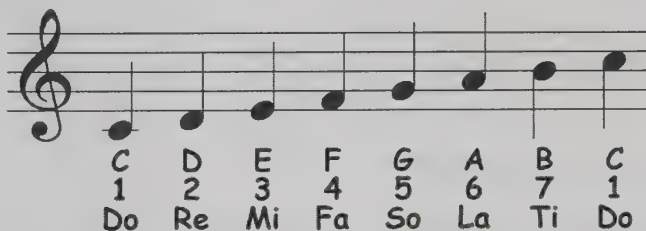


A crazy but brilliant British philosopher named I.A. Richards (1893–1979) became convinced that one could really speak the best English using only 850 words. He thought you shouldn't worry about ambiguity (multiple meanings for the same word), you should take advantage of it. Never use an exotic or specialized word when a common one will do the communicative work. See his book *Basic English* (1930). Logicians have a love-hate relationship with this fellow. I know I do.

But *notation*, being even more generalized than simple words, whether in mathematics, logic, music, or other fields, is a set of short-cuts for expressing the same concept or group of concepts quickly. In every profession, in every line of work, in many areas of recreation, people develop ways of expressing a lot of stuff in a few marks.

Abbreviations, acronyms, place-holders, even the X's and O's used to represent the movement of players on a football field, a basketball court, or a soccer pitch, will be subject to what are called "conventions." If you go to the breakfast café and hear the wait person telling the cook to "scatter and smother the eggs, and put shoes on it," you have a specialized language for preparing eggs at a restaurant. If you look at what got written down when you ordered, you would find a notation system. When I was a teenager I was a car-hop and we would write this on the order ticket: "1chOPLTM." That is a single burger with cheese, onions, pickles, lettuce, tomato, mustard." The toppings were written in that order because that was the order they went on the burger –onions closest to the meat and mustard on the bun. We didn't have computers to punch the order into. Perhaps you have seen this in old movies, people writing down an order at a restaurant?

Having conventions for a system of notation means that lots of people agree to use the same marks or noises to express the same thoughts in a kind of short-hand form. Consider this:



All four of these lines of notation express a C major scale. The numbers can be used for any major scale in the common mode. Each note has a name as a relation to the whole also: C is the "tonic," D is the "supertonic," E is the "mediant," F is the "subdominant," G is the "dominant," A is the "submediant," and B is the "leading tone," then back to the tonic. All of these forms of notation encourage different



ways of thinking about and using the concepts they express. They are the language in which musicians communicate tonal relationships. Notation externalizes it.

Notational Independence

But it's weird. I could just start writing down notes, in any of these forms, and I might have no idea what they sound like, in that order, unless I actually play them (some people hear them when seeing them, but not I). I could put the letters on an eight-sided die, or two eight-sided dice if I want dyads, etc., and roll to determine the order and see what melody they created. Or I could just use the numbers and skip using the letters. Beautiful melodies have been generated this way. So have many awful ones.

I can do the same thing with arithmetical symbols and logical symbols, and other conventional systems of symbols. As in a game of Scrabble, I can even just rearrange letters of the alphabet, making a "word," and I won't know if it has a meaning unless somebody challenges my arrangement and we look it up in the official Scrabble dictionary.

So, I played Scrabble with a bunch of Polish folks once —it was a Polish Scrabble set, which has all sorts of letters that hardly ever get used in English, with tons of z's and j's and y's. They don't use as many vowels either. I can't speak Polish well enough to play, so they decided to allow me (and only me) to make English words connecting with and from their Polish words. It does not work. (I lost, badly. Normally I would never lose badly.) There just aren't enough English words that use z's and y's and j's to mix the game's language. It would probably work to do this with French or Spanish, maybe even German. Not Polish.

The notation system, once it is created and settled by convention, has independent characteristics that no one really thought about when creating the system. The symbols may exclude possibilities we didn't anticipate, and it may have some relations internal to the system we didn't foresee. I will explain.

Comprehending Symbols

Most of you have studied other languages and some of you will even be fluent in more than one language. You learned that you can think different thoughts in each language, and that some thoughts that you can think in one language are really hard to formulate in the other one. That is why translation is an art, not a science. But it's also partly because **systems of symbols carry with them their own assumptions and embedded relations**. Often, good thinking has the task of bringing out and making clear and explicit what was *already there*, in the



background of our thinking, but we were unaware of it. Or, what is weirder, we experiment with our notation system and find stuff nobody ever thought of. For example, I might look at a piece of organ music and realize that it could be played by a string quartet without any changes (that has happened). Or you might look at a poem and realize that the first letter of each stanza spells a real word or even makes a full sentence (and in that second case, you'll think the poet intended it, but not necessarily so in the first case).

But good thinking can also help us bring out what is implicit *in the symbols* (not just the notation) we use to express our thinking. This second activity is a power of interpretation, not just a capacity to recognize patterns. Remember all that we learned about interpretation earlier in the book. Here we move to a deeper power, especially in the *interpretation of signs*. There is a whole field of study called "semiotics" that studies and tries to improve this power of interpretation. Semiotics is closely related to logic. You should study it someday. I'm using it in this book. That is where the account of interpretation came from, what you learned earlier.

The power of *forming* useful signs is also something we have been working on in this book. We have spent only a little bit of time developing your power of interpreting signs that you did not create or use yourself. Now we move on to that task, of getting good at understanding and using the signs, and the systems of symbols, that *other people* have created to address our shared problems. They have been devised by many people and improved by many others. But they are not perfect.

Learning the standard symbol systems of logic will require some memory work on your part. But you are now in a very good position to understand *why* we use the symbols we do use in logic. This practice has a history of over 2400 years (since Aristotle). People have refined and changed and experimented with ways of expressing these thoughts. There are hundreds of different well-developed systems of logical symbols, all of which express different ways of thinking through the things we humans think about. If one set of symbols does not help you with a problem, a different set of symbols might be better. You can always make modifications to fit your problem. That is part of what you have been learning to do up to now. Got a problem? Make up a symbol scheme and think about it. If it doesn't get you anywhere, make up a different one.

Intensive Inclusion vs. Extensive Inclusion

We have learned so far that when we think, we sort of carry along with us, either actively or passively, all the stuff we have stuffed into our next thought, and we also drag along whatever we left aside. This is **intensive inclusion**, and even the stuff we "leave aside" (from the connotative field, when we make it into a new denotation) when we transform a predicate term into the next subject term, is sort



of “still *there*,” hovering around our thinking and contributing to what it means. We can unpack all of that stuff with a moment’s work, by thinking back through our process.

But when we begin thinking using *externalized* symbols (we may not even be sure what they stand for), the process is different. If someone asks you to add 2 and 2, you don’t usually say “two of what?” You might ask, if you are suspicious. After all, two ounces of water and two ounces of vodka isn’t four ounces of anything – some weird dissolving and bonding occurs and you have less total liquid. So, news flash: $2 + 2$ is not always 4. Two apples plus two oranges requires a generalization: four *pieces of fruit*, or “things” or some other substantive expansion. Without the generalization, you just have two apples and two oranges. But usually you’ll ignore fringe cases like these, carry out the operation, give the standard number “4” and move on.

When you carry out operations on symbols, in a way you are still *thinking*, but in a way, you are *not* thinking. You are by-passing the actual thinking by way of operational short-cuts, and assuming that we can all adjust if the operations do not work with exactitude in some contexts (like alcohol and water, or apples to oranges). Intensive thinking, on the other hand, carries the exceptions along *with* the reasoning, while *extensive* thinking requires *concretization* (action, calculation, summing, proving, testing, experimentation, etc.) in order to use it.

For example, when calculating the volume of jet fuel for a flight, one must adjust for the changes that occur under the lower atmospheric pressure and temperatures under which the fuel is burned (it’s cold up there in the thin air). Plus, the plane gets lighter as fuel is burned, and that affects its efficiency, and the variables are numerous. Ask any pilot. You can’t just “do the math” without reference to what it applies to, but if someone sets a formula in front of you (let’s say for jet fuel consumption), and doesn’t tell you *what* it measures, you might still be able to carry out the operation. You just wouldn’t know it was about fuel.

Still, you would not be able to make adjustments, if needed, or ask intelligent questions about whether you had solved the problem adequately and applicably. Your operations may or may not be elegant, but it is difficult to say for certain, because the *purpose* of the operations has been left out. Fuel consumption for automobiles and aircraft are analogous, but the consequences of a miscalculation are quite dis-analogous. It is good to know your purpose.

There is a very great difference between leaving something *out* (extensive exclusion) and leaving something *aside* (intensive exclusion). In your active thinking, you have to leave aside possibilities that would take you down a different path, but they remain as active contributors to your meaning and progress, and you can revisit them if your overall purposes, in thinking, are not attained. But when



something is left *out* (not by you, but by those who have posed the problem, or because of the notation system), you are not in a position to be confident about how well a purpose has been attained, or even served. By contrast, intensive *inclusion* and extensive *inclusion* are different but closely related (we can call these “implicit meanings”). Intensive *exclusion* and extensive *exclusion* may have almost no traceable relation to each other. They are very different processes.

You, the Machine

In cases where you carry out operations on symbols without knowing what they stand for (the purpose of the operations and symbols), you are behaving more like a reasoning machine than like a reasoning human being. Unhappily, much math education and much university education in logic emphasizes this machine-like behavior. Back when the public curriculum was being settled (the first half of the 20th century) we did not have good machines to do mathematical and logical operations for us, at least not very complex machines. People have had the abacus for a long time, of course, and mechanical adding machines have been tinkered with for several hundred years (clocks are adding machines of a sort).

Back then, there was some serious value in teaching individual human beings to calculate like machines. It was important for your independence and functioning in the world. You would never need to do algebra or calculus unless you were an engineer or something, but everyone learned it anyway. But there is very little reason to educate people that way today. In the past, human beings were trained to substitute an extensive process of formal operations for their inner thinking processes (which are often very disorderly, as we have seen). You were taught to trust the extensive operations above your own thinking. That isn't good. It kills the balance between creative and repetitive thinking.

Back in a still earlier day (18th century), they came up with the idea of “validity” to try to organize the relationship between these inner processes and their outer counterparts. That guy I mentioned earlier, Immanuel Kant, was the kingpin of validity. He needed to get a life, worrying all the time about whether his subjective thinking processes had any real purchase on the objective order of the world. I mean, of course they do, or you'd be dead Professor Kant! But he taught us something. From *within* your thinking (both active and reflective), **validity is an experience of necessity**, of having your thinking swept along with no possibility or turning aside. It is an *experience* of seamlessness (even if there really are some seams).



How's the Weather?

Here is an example:

If it rains, then I will take my umbrella, and it's raining, so I'll take it.

This feels almost like one thought. It is actually a line of thinking, using several concepts. In traditional logic books they might express this as follows:

$$\begin{array}{l} 1. R \supset U \\ 2. R \quad \underline{\hspace{1cm}} \\ \therefore U \end{array}$$

The hook-looking symbol means “if ... then.” If R then U. Remember that the premises are really conjoined and they stand in relation to the conclusion as providing everything needed, so we could say:

$$[(R \supset U) \cdot R] \supset U$$

The brackets come second, in operational order, and braces $\{\}$ come third. It is a common convention. That expresses the whole argument as one *proposition*. But we can *generalize* it also (I know you hate this part):

$$\begin{array}{l} 1. p \supset q \\ 2. p \quad \underline{\hspace{1cm}} \\ \therefore q \end{array}$$

What do p and q stand for? The italicized lower case letters are (as you probably know) called “variables.” This argument form *includes* the argument above with R and U, but also any other *constants* you might want to plug in to the same places. R and U are called “constants” because we used them to stand for “Rain” and “Umbrella” for this piece of reasoning, i.e., the subject term that substitute for full proposition: “It is raining” and the subject term from the proposition “I take my umbrella.” We might go back now and say that we are at the Weather Barn at Rancho Logos, and in that barn we find rain and snow and fog and mist, and was also find umbrellas, snow shovels, and fog lights, and other stuff. We may work out the concepts contributing to each of these, and form a class:

$$C = R, Sn, F, U, Sh, Fl \dots$$

And now we may say our universe of discourse for this bit of reasoning is restricted to these elements:



$UD = R, U, t$

And we have specified a relation “to take,” which we bring to the elements to make them visible in a certain way, and we assert $R \text{ } t \text{ } U$. It is very different from $U \text{ } t \text{ } R$, isn’t it? You see that “to take” is is_{10} (as acting). You are pretty much finished *formalizing* your intensive inclusions. We skipped making a fully detailed argument because of the way we set up the UD. It is so small that there were not many possible arrangements of the elements and the relation. We left aside the other possibilities when we formed the UD. Not many horses in this corral, and only one trick to teach ‘em –taking. But we could have said something like $R \text{ } t \text{ } U$ “or not,” to remind ourselves, with a disjunction that the sky might just sprinkle and mist and spit, without full-on rain. We could have included sunny weather, or partly cloudy, and so on. But we left these aside. All of that is back in the barn. You can retrieve it if need be, but you are making your thinking simple, tight, clear, parsimonious, and elegant, right?

The symbols we chose at first for the raining-and-umbrella argument *concealed* all of this intensive assuming and thinking and leaving aside. And the symbols about classes and universes of discourse conceal the *argument-level relations*. Assembling symbols into arguments leaves aside many possibilities for thinking, more open possibilities. It focusses the symbols into a tight arrangement. What if you come upon this:

1. $p \supset q$
 2. p _____
 $\therefore q$

What does it mean? It can mean the raining-and-umbrella argument, but it can be any other argument that uses the same *form*. So, as I said, this is an argument *form*, not really an argument (yet). It has no purpose except to demonstrate how one *might* argue. To make it into an argument, you have to give it an *interpretation*. We have encountered this word before, haven’t we? It is the same thing now as it was many chapters ago, but with this addition: when you see a collection of symbols like this, it’s like encountering another person who is speaking a very abbreviated language.



Extensive Inclusion

Remember the preacher in the park who wanted to know whether “you have repented”? You had to do a lot of work to decide that the best answer was “yes,” and to flip him a quarter. What if he had *only* said “If R then H!” while pointing at you? (One assumes that “H” means “heaven.”) You might have actually gotten that, because you know what preachers in the park say when they point, and why. What if he didn’t point and only gave you this, on a card:

1. $R \supset H$

2. R

$\therefore H$

You might need some assistance here, right? But this is why *you* assert “R” when he asks, which is what “yes” means, to the question-form of this declarative sentence. It’s like a weird kind of *Jeopardy!* “Yes, I have repented, so R.” But the more we move toward symbols, the more work we have to do to understand the relation between the *form*, which is an expression of *extensive inclusion*, and the actual thinking we are being asked to carry out, individually, in a given case, which *depends* on intensive inclusion. And, darn it, it’s annoying that we can sometimes *understand the form*, and what it expresses, *without* knowing how to interpret it in the context.

As we move further into symbolic logic, we move further away from intensive inclusion and increasingly study extensive inclusion. The assumption is that these extensive inclusions give us templates or instructions for expressing the intensive inclusions we have been thinking (both actively and reflectively). If we get the extensive forms right, knowing the good ones from the bad ones, we will be able to use only the good ones, avoid the bad ones, and our thinking will, with practice, fall in line with the good forms. This is why most logic books teach you symbols and give you the rules for manipulating them. They are supposed to improve your thinking

In fact, this rarely works. People can become very good at carrying out the operations without ever bringing them to their real (intensive) process of thinking. It is like a math major who becomes addicted to casino gambling. That person understands that over the long term, the house wins. The math is indisputable. The gambler acts against the math anyway. The reasoning is intensive “I will be an exception,” or “I will beat the odds,” or something else even less relevant, like “I really need the money.” This stuff gets into the corral when it doesn’t even belong in the barn. Often it is unexpressed, so the intensive inclusions never match up with the extensive reasoning of which that person is capable.



Some time back, when I lived in Oklahoma, they were arguing about whether to have a state lottery. I saw a bumper saying: "Lottery. A tax on people who are bad at math."

The point: Plenty of people who get good at identifying and using valid forms of reasoning still make choices that defy the very logic they understand. Knowing that a certain politician is giving a terrible argument, or many of them, they vote for that person anyway. It is irrational. But it is the human way. You won't change it. You must learn to work with it, in yourself and in others.

Intensive inclusion genuinely changes us, when we improve it. Extensive inclusion may not, and often does not change us, unless we consciously conform our habits to the patterns that have been discovered to be valid over the course of history. Doing that is no fun. It's like being on a diet for the rest of your life. It kills creativity and makes you boring, Sheldon. Being habitually irrational is no fun either. It makes you anti-social. People start making allowances for your behavior and not telling you they are doing it. Therefore: you must find the relation of validity and learn what it can do for you. It is an important norm, even a high virtue in thinking.

Operations

The *operations* that bear on *validity*, as captured in the *p*'s and *q*'s above, have very limited power in the real world, with one exception: they work well when we communicate with computers. We will be learning much more about that kind of communication. In the meantime: **Validity is the most important idea in logic because it is the main idea that links our mental lives with our power of interpreting the world and acting in the world.** Some logicians try to use the idea of "truth" to do the connecting, but after a century of arguing over this, they haven't gotten to a definition of truth that does any good. Mainly they can't explain why so many falsehoods "work," and they also can't agree about how we can really *know* that an assertion is true. We can see when an assertion succeeds or fails, which is what we have studied here, but we are never certain *why*. For the most part, we have left aside the idea of "truth" in this book, and you are better off because we did. I don't think validity has anything to do with truth, at least not in any clear or direct way.

But intensive and extensive inclusion are still quite different, even though closely related, and even when we have worked to discover and use valid forms, ones that are both intensively and extensively seamless.



Revisiting the Visible Spectrum, or Not

Let me give some examples of inferences that are objectively valid (they work in almost any argument):

If my $C = B, G, V, I, O, Y, R \dots$ and my $UD = B, Y, R$; and then I assert “R,” that alone is valid. It is objectively valid only because I have included R in both my class and my universe of discourse, and now I pull it from those contexts and assert it. The only inference required is that the “R” I asserted is the *same* R that was in my UD, and that the R in the UD is the *same* R as the class included. The only relation involved is is_{\neq} , which is identity. This is the simplest form of matching extensive inclusion (how *anyone* would interpret R as asserted) with the R *intended*. It doesn’t even matter what R means, really, because we can see the forms match. R in the class, R in the UD, R asserted. Everything tidy.

If I interpret the same class as the “visible spectrum,” and call the UD “primary colors,” I might add the relation wl (wavelength). I might then assert $B \text{ } wl > R$. You’ll know what that means. Still, its validity is quite a bit more complex. Thinking the thought that Blue (as defined by the visible spectrum) *includes* in one sense a wavelength that is longer (greater than) comparable Red requires a tremendous amount of history and scientific discovery that has nothing to do with creating the symbols for that relation as a thinking process that *does* succeed as an assertion about the world. Stretch a blue, get a red. The red *includes* the blue in a different sense. Squish a red, get a blue. You can see inclusion as squishing or stretching, or any of a million other transformations,

Is this formula and its interpretation, then, a “valid” inference? Yes, I think so, but not because of the visible spectrum or the science of optics. It is a valid inference because the thinking is clear (tight, parsimonious, etc.), and the extensive alternatives to the *inference* are excluded, as far as we can account for them. The intensive inclusions and extensive inclusions are closely analogous, and the symbols do not get in the way of our understanding that relation. Indeed, they make that relation clearer than it was in generations who understood both logic and optics less well than we do.

I could take the same class constants, not mention the visible spectrum, indeed, offer no interpretation at all, bring the elements B and R into a UD, and say this:

1. $B \supset R$
 2. B _____
 $\therefore R$

And I have a valid inference. Its validity still has to do with the way intensive and extensive inclusions are analogous, and how extensive alternatives are excluded, but in this case it is because both our thinking, and the symbols (*not requiring any*



knowledge of the facts of the physical world) follow a rule that has been confirmed as valid. This is the argument form:

$$\begin{array}{l} 1. p \supset q \\ 2. p \\ \hline \therefore q \end{array}$$

That form is familiar by now. It has a name. It is called *modus ponens*, which is Latin for “the affirmative mood” or mode. There are several argument forms that have names like this. There is another one that is a good deal like a serial predication:

$$\begin{array}{l} 1. p \supset q \\ 2. q \supset r \\ \hline \therefore p \supset r \end{array}$$

This one is interesting because it uses the “if . . . then” symbol to indicate that whatever you stuffed into p while moving on to q is still with you when you move through q to r . This does not make for a good argument with just any relation you might think of, but it works with all transitive relations, and as a *form* it describes, as a generalized process, how stuffing a subject into a predicate always happens, even when the relations are not transitive. When q has been transformed into a denotation in its second occurrence (premise 2), this argument form does successfully tie our intensive inclusions to our extensive inclusions. It is called a “hypothetical syllogism,” and it makes for a convincing and objectively valid argument. Yes, it looks like a serial predication. It is nearly the same thing, but it is an argument, not just an act of predication.

There is one more valid form that we can use without having to invoke “~” or “not.” It is called a constructive dilemma, and it is a very interesting valid argument form:

$$\begin{array}{l} 1. (p \supset q) \cdot (r \supset s) \\ 2. p \vee r \\ \hline \therefore q \vee s \end{array}$$

This is a complex disjunctive form of *modus ponens*. What it shows is that hypothetical thinking can survive the disjunction of terms under certain conditions. For example, we may not know whether the Cardinals or the Cubs will make the playoffs, but some seasons, at some points in the season, we can know that one of them will (the other teams being already eliminated), and perhaps both, depending on the outcome of their respective games (head-to-head and when not playing each other). Many of the disjunctions we use in such situation are dilemma-form. The same is true with many other sports leagues when we estimate who has to win and when to make the play-offs. In NCAA football, the comparisons are so complicated that only computers can calculate them.



We *do* reason this way when the occasion arises, and we can *follow* this argument in our active thinking if it is expressed clearly enough. It helps to write it down, though. Notice that there are some limits that have to be in place in order for this argument to join our intensive inclusions to our extensive inclusions. How many games have been played, how many will be played, how difficult are the common opponents to beat, how difficult are the opponents not shared to beat, how many head-to-head games have there been and will there be, and what outcomes are already recorded, and the list goes on. That also means knowing a lot about what is *not* going to happen, since every inclusive limit brings with it a collection of exclusive limits. So the reasoning is *conditioned* on limits of that sort, but it is still affirmative reasoning.

Members and Elements

The other popular valid argument forms use negation, and so they depend not just on limit conditions, as above, but on outright contrast. The easiest way to think about this difference between arguments that use negation and arguments that do not use it is that it always has to do with the difference between what is in the *class* (the barn), and what is in the *universe of discourse* (the corral) at any given moment. You have to move things from the class to the UD before you can use them in an argument. The class is just the horses in some part of a barn. You don't have to know how many there are or name them all in order to specify a class. But when you move them to the corral, you have to define them very clearly, in light of some purpose, find their essential core (make a concept), and name them all.

When you have done that, they are *elements* of a UD. Before that they are just *members* of a class. **The difference is enormous.** As members of a class, there is a lot of vagueness. As elements of a UD, they are completely distinct individuals. Negating terms in an argument is negating something wholly determinate. The same is true of negating whole propositions, and compound propositions connected by "and" and "or." These negations are hard, definite negations, and that's what we use in arguments. When we leave something aside because it didn't get selected for the UD, it isn't really negated, it's just not in use.

If we have a class of the visible spectrum, we know that the members blend into each other, and it's pretty hard to tell where blue becomes indigo and indigo becomes violet. That happens in many classes. But to move something to the UD, we need a definition. We could specify, for instance, the exact wavelength at which we will *call* a color violet. The standard is 385-435 nanometer wavelength. Above that number, beginning at 436 nanometers, we will *call* it indigo, until it gets to another number (501) that we *call* blue, and so on. So, in the corral, we have decided and judged what individuals are in the class, the elements, and which are *not in* (belonging perhaps in the barn, but not even a candidate for the UD). Such would be, for instance, other wavelengths of electromagnetism that are not part



of the human visible spectrum, such as radio waves, gamma waves, even infrared and ultraviolet light.

This “not in” the UD is the *most* general meaning of “not” for our reasoning *in arguments*. But it is vague negation. So, if my UD is Blue, Red, and Yellow, I can say $\neg O$ (not orange), and then, checking the UD, I see that O is not in the UD, then I can use $\neg O$ as part of my argument. Do I really know the difference between this $\neg O$ and, say $\neg G$ (not Green) based on this kind of “not”? No, but it doesn’t matter much. “Not in” the UD but still in the class is a vague not. As a matter of convention, we agree to limit the symbols we use with the “ \neg ” to those that *are* members of the class *but not currently in* the UD. So as long as B is in the UD, I should not assert $\neg B$ because it isn’t correct. If I assert $\neg B$, it means B has been removed from the UD or was never in it at all.

So $\neg O$ only means orange is a member of the class, but not currently in the UD. If I name the class VS (visible spectrum) I can say O is a member of VS. This is expressed: $O \subseteq VS$. I can express that an element is included in a UD in a different way. If my UD is the primary colors (B, R, Y), I can say $B \in PC$. Blue “is an element” of the UD called “Primary Colors.” (I need a relation to make it a term, remember.)

To form an argument using “not” (\neg), there is a principle of inclusion that must be respected, which is that the UD must be included in the class. This is the symbol for that principle:

$$UD \subseteq C$$

This means the **universe of discourse is included in the class**. When this holds, one can also say:

$$C \supseteq UD$$

This means that the **class includes the universe of discourse**. In the example, we can say:

$$PC \subseteq VS$$

The interpretation is “the primary colors are included in the visible spectrum.” So, before we can use “not” with clarity, the following must be a secured relation:

$$(UD \subseteq C) \cdot (C \supseteq UD)$$

If you do not secure this relationship, your use of “not” will be “ambiguous,” as we say. It will not be clear whether $\neg p$ means that something is not an element of the UD, or is not a member of the class. Classes can be expressed as open-ended lists.



Universes of Discourse must be enclosed, completely. If you find that you need an element for your reasoning that is not currently in the UD, you must re-define the UD to include it. If that needed element is not even a member of the class, you must place it in the class before you include it in the UD. Conception to concept.

When you follow this convention, your use of “not” will be clear. You now have many more valid argument forms to use. For example, you can do this:

$$\begin{array}{l} 1. p \supset q \\ 2. \neg q \\ \hline \therefore \neg p \end{array}$$

This is a famous argument form also, called *modus tollens*, or “in the denying mood or mode.” It is a conditional argument saying the since p implies q , that where you find the first element, you always find the second, and since we can’t find the second one (in the UD), the first one must not be there either. It’s like saying that second horse always follows the first one around, and if you don’t see the second one in the corral, you know without looking that the first one isn’t there either. They are both in the barn.

Now, this is not a very useful argument, since all you have to do is look at the UD and check to see what’s in it. But perhaps if the corral is crowded with horses, it would be easier to look for the second horse only. It’s pretty rare that this argument form helps us.

But when you are trying to convince somebody of some conditional claim, like, “if the referee had made the right call, my team would have won the championship!” And someone says “but you didn’t win.” And I say, “and the ref didn’t make the right call.” We do talk like this, and we do follow it (the references line up well enough). You can see that the class is “the game” and the elements of the UD are the individual plays or events, and you are specifying one element (one play in which the referee made a decision), and bringing it to visibility with a relation, “to call,” which is is_{10} (as acting), and the subject term is the referee, and the predicate term is whatever call he made (say, “pass interference,” in the 2019 NFC championship game between the Saints and the Rams, not that I’m complaining, just because I was deprived of seeing the match-up of the two greatest quarterbacks in football history in the Super Bowl, due to a lousy call). The reference is something like “bad-call-making-dude.”

But what if you disagree with me? You could say what? “Your team would have lost anyway.” What does that mean? It means “I can grant that the UD contains the elements you say, except one, which is winning the game.” The first UD had only two elements: the referee and the win, but the call wasn’t in it; and then there is a second UD which includes the referee *and* the call, but the win isn’t there. You



just said I can have a UD that includes the referee and the call, and still excludes the win. I have not understood the relations of all of my elements. You claim. This is the problem with conditional arguments. When the specified conditions aren't satisfied, we don't know how to judge the subsequent claims. A lot of time and energy gets wasted on conditional arguments.

So, in this example, we aren't disagreeing about the meaning of the concepts, or about their names. That sort of disagreement can be cleared up with more work on the concepts and conceptions. We are having a disagreement about what is in and out of the corral and the relations I chose to make them visible as terms in an argument. You can see how complicated things get when we use "not." We can also group elements together and say "none of these is included in the UD." So I may say, UD = PC (primary colors) and therefore $\neg(I, V, O, G)$ (which are included in the class, but not the UD). I can also say, for example:

$V \notin PC$

This is interpreted as Violet is excluded from the UD called Primary Colors (not an element). If you want to say that a certain name or entity has *not yet* been included in the class under discussion, it is best to say it this way:

$p \notin C$

This can be read as p (some constant) is not a member of the class under discussion. So it is best to remember that nothing can become an element that isn't included in the class. Where $p \notin C$ is the situation, you can bet that $p \notin UD$.

Inquiry

The process of creating a class is for the purpose of inquiry in general. The purpose of bringing some members of that class to a UD is to carry out very close analysis of the meaning and relations that can be attributed to those elements when they become terms in a proposition, or a group of propositions. You have to describe the conceptions and refine them into concepts and then you can try out relations to see whether the intensive inclusions and the extensive inclusions (what others confirm by their interpretations) are closely analogous. If they are, you have validity.



Some More Valid Forms

The argument forms that have been discovered by logicians in the last two centuries include these:

1. $p \vee q$	1. $p \vee q$	Disjunctive Syllogism
2. $\sim p$	2. $\sim q$	
$\therefore q$	$\therefore p$	

1. $(p \supset q) \cdot (r \supset s)$	Destructive Dilemma
2. $\sim q \vee \sim s$	
$\therefore p \vee r$	

The most important valid form in all of logic is the disjunctive syllogism. We must spend a little bit of time on that before moving forward. You can see it means that at least one element, maybe p maybe q , and perhaps both (p, q), are definitely included in the UD. If one element is not found in the UD, the other one *has to be there* in the UD. This is the intensive meaning of a disjunctive syllogism.

This is a bit like the hold-up man saying “your money or your life.” It means, go ahead, don’t cough up the cash; you won’t be around to tell the tale. But you might reply to him, “how do I know you won’t kill me anyway?” The hold-up man says, “you don’t but you know that I *will* kill you when you *don’t* hand me the cash.” Your robber is a very astute logician.

The argument is objectively valid, but it does depend on our knowing something about the disjoined terms in the proposition that might not hold in other situations. Namely, that one or the other is definitely in the UD. Maybe both. That means that **the relationship is the same as sub-contraries**. Both might be absent from the UD (the robber never makes that assertion), but once the assertion of the disjunction is made, at least one (and maybe both) of the disjuncts must be in the UD. Give him the money, he may also kill you. Don’t give him the money, you’re dead.

This illustrates the meaning of what logicians call “necessity.” **Necessity is the second most important norm or value in logic (behind validity).** It cannot be defined without using negation, and it is a complex idea. Logicians argue about what it really means. It is a strange relation. Someone is claiming that a relation between two terms is so very common and tight that it is universal, **in the context of the relationship between the class and the UD**. It’s like having a pair of horses in the barn, and any time you go into this one corral, you can bring only one of the horses, and you can bring both, but you absolutely must include at least one. If you do not, your intensive inclusions can never be analogous to your extensive inclusions, at least when you are making assertions about *this* universe of discourse.



But it doesn't have to be limited to just two elements. You can disjoin *all* of the elements in a UD and claim that you *have to have* some group to form an objectively valid implication from this UD. We discovered this with the cake recipe. You can leave out one or two of the elements, but not more than two or three, and still have a cake. (*That* is the UD, the cake.) Necessity can work at many levels, then, within a UD, but it never really applies from the intensive inclusions to the extensive inclusions. That relation (analogy) is contingent, never necessary.

The Golden Relation: Analogy of Inclusion

Analogy is as close as these extensive operations ever come to being like genuine human thinking. That is why the use of the computer metaphor for our brain function can be misleading. It isn't actually a metaphor (a seamless, unconscious substitution), it is an analogy. There can be a kind of necessity in extensive logical operations that mimics the genuine necessity found in intensive thinking, but mimicry is all it is. You can get rid of a bothersome extensive necessity by adopting different rules. (We learn more about this in the next chapter.)

It is not far different from changing the rules in a sport. Football players were once allowed to hit each other in all sorts of ways that are now against the rules. In baseball, the pitcher always had to take a turn at bat, but then the American League changed the rule so that the pitcher didn't have to bat. Now, the National League may do the same thing, since the COVID oandemic has changed so many of our rules, including that one. These are both very big changes in the rules, which changed the sports. It happens in any domain of life –politics, art, even religion. Change the rules, you change the logic.

The Ductions

In logic, there are three basic kinds of extensive inclusion: deduction, induction, and abduction. The rules we have been studying are deductive. They express analogies to intensive necessity where it is found in your actual thinking. Induction does not use the rules of validity or the valid forms we have looked at. For inductive thinking, the likelihood or probability of a conclusion is the way we measure the quality of the argument. The rules of probability are very complex and we need not study them here. We only need to be aware that reasoning in probabilities follows a completely different set of rules than reasoning deductively.

So, if you don't like the way your deductive reasoning looks when expressed in objectively valid forms, or the way it looks in other kinds of extensive inclusion, you can change to induction and see whether your argument fares better as a way to get your main assertion, your conclusion, to be accepted and acted upon. Those for whom your assertion is intended will see it differently when you say it only has



a degree of probability attached to it. You'll still need to work out your concepts, but you don't put the argument together the same way. You may now wonder: when I am thinking intensively (*to myself, for myself*), can that be done inductively also? The answer is yes. The experience is very different, but here is an example of the differences.

Deduction

If you know that a pitcher has only three pitches, a fastball, a curveball, and a slider, you know that, as a general principle, he will throw one of the three on every pitch. This is where "or not" always accompanies your thinking as an intensive accompaniment. After all, the pitcher may try something new, or you may be wrong about how many pitches that pitcher has. But now you want to decide which pitch he will throw next. You can try to *deduce* it.

The count is one ball, two strikes. He doesn't have to throw a fastball (almost always the most accurate pitch). Therefore, he will choose between a slider and a curve ball. He has thrown the slider three times already. He will therefore throw a curveball (the least accurate pitch), and not inside the strike zone (here comes a sub-argument), because he does not have to let me have a ball I can really hit on this pitch. The pitcher will "waste one" to see if I swing. Therefore, I will not swing at this curve ball. That is deductive. All decided before the ball is pitched. If the pitcher throws any ball in the strike zone, you will be called out. It does not matter which pitch it is, since you decided not to swing (your conclusion). Deduction is like that. The conclusions are not flexible, and the argument is supposed to include everything that is relevant to the reasoning. This deduction does do that, leads to a decision, and the decision is acted on. If you're wrong about the most important part, you're wrong about the whole thing. In this case, the most important part is about whether the ball will be in the strike zone, the sub-argument. But there are many reasons a curve ball might miss the strike zone, so you drew your conclusion, and now it's irrevocable.



It is easy to capture this thinking in symbols:

$C = F, Sl, Cu, Ch, K, Si, Sp \dots$

Schema:

F = fastball

Sl = slider

Cu = curve

Ch = Change-up

K = knuckle ball

Si = sinker

Sp = split finger pitch

t = to throw (is_{10})

UD: F, Sl, Cu

1. $F \vee Sl \vee Cu$

2. $\sim F$

3. $\sim Sl$ _____

$\therefore Cu$

We have done the disjunctive syllogism operation twice. We have intensively excluded pitches this pitcher doesn't ever throw (so we believe), and our thinking is analogized in the symbols, which extensively exclude the letters that stand for pitches (an open-ended class) that we won't consider. The relation is "to pitch" (is_{10}). That act of negation, both intensively and extensively, is obviously an important decision, and we could be wrong. But we have taken that risk and proceeded deductively. We did not need to *express* the relation of pitching, since it is the only relation we are considering. But it is there, implicitly, making the terms visible.

We have added a second argument about whether the pitch will be a good one to try to hit. Let H stand for "hittable."

1. $(Cu \cdot H) \vee (Cu \cdot \sim H)$

2. $\sim(Cu \cdot H)$ _____

$\therefore (Cu \cdot \sim H)$

And we added a third argument about swinging (Sw):

1. $[(Cu \cdot \sim H) \cdot Sw] \vee [(Cu \cdot \sim H) \cdot \sim Sw]$

2. $\sim[(Cu \cdot \sim H) \cdot \sim Sw]$ _____

$\therefore (Cu \cdot \sim H) \cdot Sw$

We *assert* this final conclusion by not swinging, or, as they say in baseball, "taking"



the pitch. We could have negated our whole conclusion by deciding at the last moment to swing. This is part of the reason that there is no necessity that connects intensive from extensive exclusions. **You do not have to act in accordance with your own thinking. It is related to the world as a substitute, a metaphor, and when worked out explicitly, that relationship becomes an analogy.**

The point is that what is asserted and what is included in thinking do not have to agree. That does not destroy the validity of the thinking and its relation to the expression of the thinking in symbols. You can always assert something without thinking at all, and often you regret doing that, especially where thinking could have helped. Sometimes we don't have time to think and must act before thinking things through. Logic cannot help with that situation.

What makes this example "deductive" thinking is the form of the argument, both the thinking and the expression of it. It is a fine example of a valid argument, following the form of disjunctive syllogism. It could also be expressed conditionally, using the hook symbol.

$$\begin{array}{l} 1. [(Cu \cdot H) \supset Sw] \vee [(Cu \cdot \sim H) \supset \sim Sw] \\ 2. [(Cu \cdot H)] \vee [(Cu \cdot \sim H)] \\ \hline \therefore Sw \vee \sim Sw \end{array}$$

This constructive dilemma captures the situation expressing that I must either swing or not swing regardless of whether the ball is hittable. But laying down a new condition, I use modus ponens:

$$\begin{array}{ll} 1. (Cu \cdot \sim H) \supset \sim Sw \\ 2. (Cu \cdot \sim H) & \text{(this is a guess, of course –see below)} \\ \hline \therefore \sim Sw & \text{(this is a decision, but not yet an act)} \end{array}$$

This kind of symbolic expression is best reserved for situations when we *do not have to act*, when we are considering what we *might* do, not what we *will* do. It is best to think in disjunctive syllogisms when you really have to act. It is healthy to think in conditional forms when you sort out possibilities and can wait to see what conditions actually come up.

Induction

On the other hand, you might proceed inductively. You think:

"I have seen three sliders in a row. He probably won't throw a fourth one because I have that pitch timed. He probably won't throw a fastball because he does not have to have a strike on this pitch. He probably will throw a curve ball, and that is very easy to see, as it happens, because his arm moves differently and the ball spins in a way that is also easy to see, especially because the pitch is almost always a lot slower than the other two. So, the



evidence suggests a likely curve ball, and I can swing at that if I stay back and wait to see where it will be. If I stay back and wait, I will not be able to hit the fastball, so if that comes I won't swing. I might be able to catch up to the slider and foul it off. So, I'm sitting on the curve ball and I have my contingency plan for the other two pitches."

Do you remember Professor Royce and his quail hunt? This is a much more organized process, but I am not trying to settle the question to the level of a final decision. I am thinking about variable probability, and my choices depending on how things develop. This kind of thinking can be *expressed* deductively, but the negations in inductive thinking are not firm negations. They draw a partial circle around the terms negated. Consider the advice of Shoeless Joe Jackson to Moonlight Graham in this famous scene from *Field of Dreams*.



<https://url.ryanbooks.com/19qeo>

Definitely inductive. Induction is a phase of inquiry that *follows* deduction. You might think it is the other way around, but actually when we deduce, we are trying mainly to clarify our concepts, and we check their validity and try to make our analogy into expression tighter so that we are more confident we have really understood and expressed the problem. When the time comes for action, we are testing our thinking, knowing that there are more possibilities than we have considered mentally, and trying to gain the best outcome in action. We delay acting until we can read the conditions best. All genuine action is experimental, which means we are never certain of the outcome, even in the most favorable circumstances (for example, tying your shoe –sometimes the lace breaks, no?).

Therefore, it is good to deduce and then adapt inductively, not the other way around.

Still, different hitters think differently. Some deduce and act on the decision, usually power hitters who hit a lot of home runs, and that is why they strike out a lot. They swing hard and count on guessing right. They miss when they deduce wrongly. Some hitters induce (usually contact hitters) and they don't strike out as much, but they hit a lot of ground ball outs because they are not committing to swing as soon and as hard.

This is a baseball example. I love baseball. But it's the same no matter what you are doing. Going to the movie or the pub, or planning a day, or considering a vacation, or what to major in, or which professor to take . . . remember, deduce to clarify. Make a valid case. Express it clearly. Get your intensive and extensive inclusions tightly analogous. That is the first phase of any good inquiry. Then use inductive thinking up through the moment of action.



At your own peril: Decide what to do on the basis of your deductions, if that suits you. But if you're wrong, you may completely fail (or only succeed by luck, which you could do without all that effort of thinking). That is because you have no control over the relationship between your intensive exclusions (those thoughts you left aside) and the extensive exclusions that result from your symbolization, or from circumstances wholly outside of your thinking that just couldn't be foreseen or that you failed to consider at all. As we will see in later chapters, exclusion is a very tough logical problem. It can be managed but not solved, at this point in history.

Abduction

Both sorts of hitters, the deductive and the inductive types, are *abducting*, which means that at bottom, they know they are guessing. We have talked about ideas, about how they underlie the central relation of our analogies. It's like that when we understand the relationship between our intensive inclusions and our extensive inclusions. We struggle to grasp what lies beneath a problem, a situation in which we must *think* because our action has been arrested or the time for it has not yet come. In that mysterious space between what we can manage to express, in symbols or in declarative sentences or questions, or even puzzled grunts, there is a sort of open space where ideas spring up, more or less spontaneously.

This is what "abduction" means. I am summarizing the insights of that guy I mentioned earlier, Charles Sanders Peirce, who was the greatest logician the United States ever produced. He was also crazy (mostly in a good way), but that's what happens to logicians. He says we sort of abduct an idea, seize it, kidnap it, draw it up from formless relation to a half formed, yet almost unthought notion. The interesting thing about this process is how often we get *just* the idea we need. This is not a matter for logic to understand. Rather, all logic *depends* on this weird guessing, because no one ever completely understands or perfectly interprets the circumstances and context of a problem, and it is *having* such problems that leads us to thinking. Here is the thing to keep in mind about abduction. It is the beginning, the very first phase of inquiry, and it must be followed by all the work we have done to bring ideas to conceptions and conceptions to clear concepts.

Having worked so hard to get clear thoughts to compare and contrast, we left the real world behind for a moment to concentrate and deduce. But the concepts and thoughts that result may have a greater distance from the real circumstances than we can allow, and so we must test, and that is an inductive process. No thinking process and no testing process is perfect, but one can do better or worse. Generally speaking, good thinking leads to better results in action. And some people are just more talented at abducting than others. They may be more perceptive, suppler in their powers of interpretation and judging. But even if your powers of abduction

are not the sharpest, you can get better. One effect of working at logic is that it gradually opens your thinking to possibilities you overlooked before.

EXERCISES

Scenario: You've all had to write the essay: "What I Did on My Summer Vacation." This is sort of the same thing, but in reverse. You have a problem. That's why you are thinking. Let's say your problem isn't terribly pressing, but time is running out and you will have to decide what to do soon. Your problem is that you will have to decide what to do this coming summer, between the spring and fall semesters. Let's assume you aren't graduating yet. You know the main options, from past experience. Now:

1. Abduce and name the most general idea you need to work with: for example, "something fun," or "something profitable," or "something productive," and so on, but stay with this, whatever else you do. You know your life. You know the range of what might be done. Some of the options exclude other options. Some could be done together.

2. Specify your Class and create a schema.

C =

3. Refine the clearest conceptions into concepts (determine the essential core of the conception) and provide a Universe of Discourse. The UD should consist of very clear options that can be done together. Don't include options from the class that are incompatible –contrary or contradictory. Sub-contraries are your friend –mutually reinforcing activities are often sub-contraries.

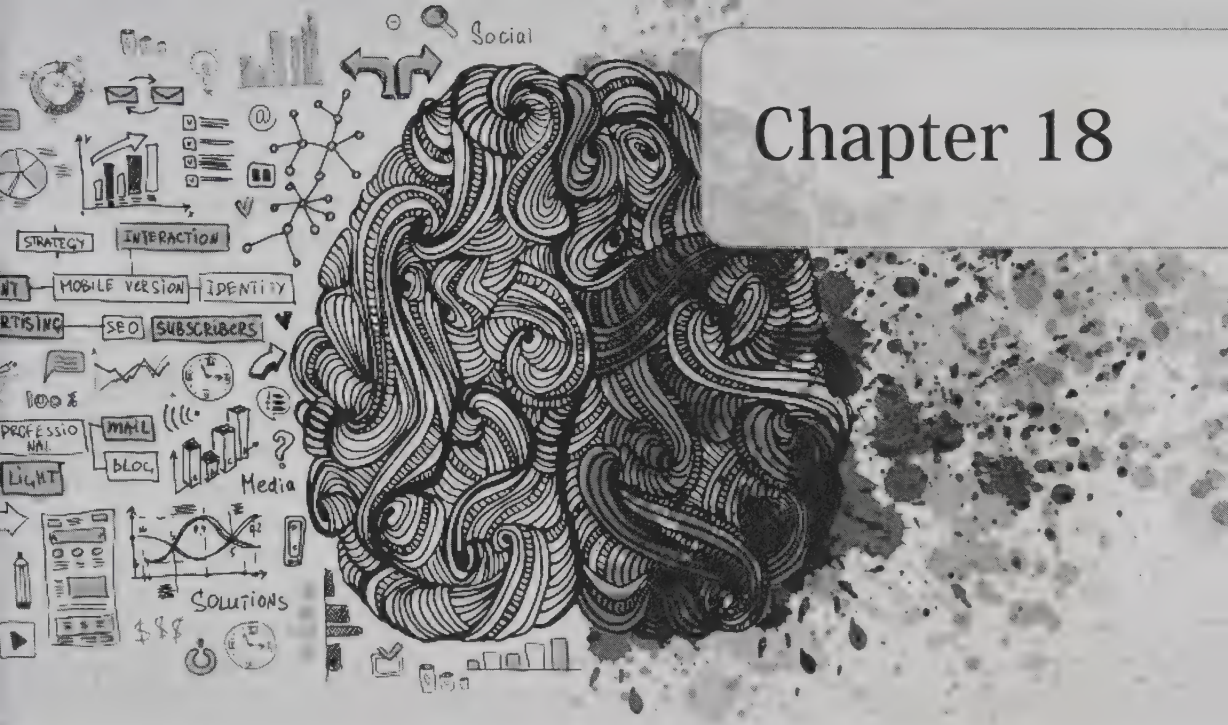
UD =

4. What relations do you need to make your elements visible as terms? You'll need to be parsimonious (not too many relations, just the ones you need). Add your relations to your UD. Hint: Most of these will be forms of is_{10} (as acting), but is_9 (as acted upon) is common too (e.g., having surgery –I hope *that's* not your summer).

5. Line up these terms in a succession, so that one is done first before a second can be done, so that you maximize the ones you can act on in the course of the time you have. This means first choosing a subject term, and adding predicate terms that can be transformed, in succession, into denotative terms. End your serial predication with the negation of whatever in the

class is excluded by your choices. Name your references and follow the course of your thinking.

6. Now you have to explain your choices to your parents or spouse, or whoever else is affected. Consider which conjunctions and disjunctions may be needed to arrange these terms in ways that will express the succession of references you have named. Conjoin and disjoin your propositions according to their compatibilities in time (after all, some things might be done in the course of the summer, but not at exactly the same time as others). You may wish to refer to Mr. Square to help you with clarity. Remember that if you do not make your quantifiers explicit to your parents, spouse, etc., people may fill in universal quantifiers themselves. "Some" is your friend. Looking for a way to express your choices as subcontraries (as a disjunction in which at least one of the disjuncts must be done, and *both could be* done), will be the best strategy.
7. Working with your disjunctions and conjunctions, express your case as a valid argument (tight analogy between intensive and extensive exclusions, with similar intensive and extensive inclusions) in symbols you choose. If there is no need to decide soon, you may decide to use conditional reasoning (the hook). If you really should decide soon, you should use disjunctive reasoning (remember that your conclusion can be a conjunction of the choices that are all doable).
8. Consider the analogy between what is intensively included and extensively included. Is the analogy close? Do the symbols really capture the process of your thinking (the sequence of your references)? If not, rework until you've done your best.
9. Consider what was intensively excluded in your thinking, stuff you *left aside*, from the formation of the class to the final argument. Will anyone be able to understand what you left aside and why you did it? Explain in a sentence or two.
10. What about stuff that is extensively excluded, just because of the way you formalized your argument? (For instance, the pitches you didn't know your pitcher had, which is to say, the possibilities for summer that didn't occur to you until you bounced this argument off of someone else, and they "hey, what about . . .".) So, what about stuff you haven't thought of at all? The only way to learn this is induction. Test your argument about this summer with someone who is affected by it. Try to speak like a normal human being, but use your real argument. What happened? Give a few sentences.



Chapter 18

SYLLOGISMS

Much earlier, back in chapter eight, we learned some things about syllogisms. Do you remember this?

- (2) middle term is major term
- (1) minor term is middle term

∴ minor term	is	major term
S	S2/P1	P2

This is a serial predication with two premises. When we think in serial order, it is easier to write it the way we did here. Serial predication is a *deductive* process (as we explained in the last chapter), so it comes in the middle phase of inquiry: after we have



abducted, but before we induce (think about testing, experimenting, and probable success/failure of your assertion).

We now need to learn about syllogisms in earnest. It isn't easy. As I told you way back when, Aristotle invented the syllogism. Some historians like to say that there were no advances in logic from Aristotle's time (4th century BCE) to the time of Immanuel Kant (18th century CE). This isn't even close to being true, but they say it anyway. Logic changed a great deal over those 2000 years, and one thing that happened was that the way we think about syllogisms went through numerous changes.

What you have learned so far is a synthesis of ideas and techniques in logic, covering the full span of centuries from Aristotle to right now. We have arrived at a place where we have adapted to the need for intensive inclusion as it relates to extensive inclusion. This is validity. It facilitates good interpretation. People "follow" your reasoning when you pay attention to this norm. Intensive exclusion has been lightly treated, so far. We mostly ignore the "leaving aside" you do when you are actively thinking. The work you have done up to now remedies that bad habit of "ignoring" our active thinking process. You now know how to watch yourself think. (If you don't, go back to chapter one and start over.) What has not yet been covered in any detail is **extensive exclusion: this is the part of our world that is actively excluded by our act of formalizing our thinking in language.**

This is the most difficult stuff to get at. The reason for that difficulty is that we may not know *what* we are excluding when we create the formalism. But it gets worse. Our natural, daily language extensively excludes many ideas we remain unaware of. George Orwell suggested in 1984 that if you had no word for an idea or concept, you could not think it. (He was surely reading that quirky guy I.A. Richards I mentioned in the last chapter.) That is not, strictly, the truth. You can think about things you don't have words for, but it's very different. Still, how would we name new ideas if we could not think them first? Orwell is right, though, in the sense that it is often functionally the way things go. Making up names for new thoughts isn't easy. You've been doing it when I ask you to "name the beast." We end up with these hyphenated monsters.

Our ordinary language formalizes our experience and does so by excluding everything that is real but has no name or description. It reminds me of this very deep philosophical sketch from *Saturday Night Live*.



<https://url.rylanbooks.com/WAWGy>

It is said that Steve Martin and Bill Murray improvised this skit because it is a live



TV show and they had extra time to fill. Steve Martin studied philosophy, and in particular, the philosophy of language. It was a much-debated problem back when he was in college, namely, the problem of “dubbing” (naming in such a way as to *capture a referent* –which is different, remember, from naming a reference, which is your *thought*, the convergence of a denotation with a connotative field, while a referent is the thing itself, in the world). We have avoided the problems of the relation between reference and referent, and of naming the referent, in the textbook you are reading, because there was a better way to approach the problem than to use logic. The difficulty is not in capturing something in the world, but in putting the references in your thinking into an order that has a relation to the world that is available to others. We have used the theory of interpretation to bridge this gap. Lots of people do it this way, from Donald Davidson to Michel Foucault to Umberto Eco. Look ‘em up.

Your thinking is a metaphor, a substitute for the actions and events in the world, and you want to communicate it. The challenge is including what you want to communicate while leaving aside what is unneeded (intensive exclusion), *and* while controlling what is excluded by your very language or symbol system so that it does not become a gap or hindrance or block in other people’s interpretation and judgment. The syllogism is created for just this task.

Much intensive exclusion is passive, in the sense that you don’t bother to think actively about what you “leave aside.” Ideas become conceptions that way, by collecting experience, while experiences not had, or had and not retained (or even not yet had) are left aside as mere possibilities we *don’t think about*. I think these possibilities left aside are far more important than most logicians realize, but that problem is for a more advanced book than this one.

When you actively form a concept from a conception, you have to leave out all but the essential core, and that means actively excluding some class members in order to set out elements of your UD for various operations. You have learned to understand and control this kind of *active* intensive exclusion.

You have also learned to specify and order elements according to some relation(s), to make them visible as terms, and this selection of relations actively and intensively excludes other (more general) relations. The more specific relations are included in the ones you chose, but the more general ones have been intensively excluded. You have learned to move actively to more generalized intensive inclusions as well, when you learned charitable substantive expansions. All of this was intensive and all was either inclusion or exclusion, or both at the same time. **All acts of inclusion imply exclusion, whether intensive or extensive, and regardless of whether the act is well thought out or just arbitrarily enacted (as thought, or formulation, or expression of propositions, or even as overt action).** You can think and act badly, after all. Or you can act without really thinking and you may get lucky.



Extensive Exclusion

The principle of *active* extensive exclusion is also not hard to grasp. In creating our formal systems of expression, we are sometimes well aware of which parts of the world we are excluding. But once the formal system has been created, we often forget about what was excluded back when we created the system. It's like when you create an outline for a paper or an agenda for a business meeting. You know your outline/agenda leaves information out, and it may be a good idea to circulate that to see whether other recognize important omissions –because once it's not in the formal outline or agenda, it may be left out entirely.

And this brings us to Google, which seems magical. The code is closely guarded, and you know very well it works better than any other search engine so far created. It isn't magic, it uses the most sophisticated principle of active exclusion that we know of: *you*. It remembers what you actively excluded in the past, and so your Google search and mine show different results (assuming Google knows who is doing the search (and if you're signed into e-mail or Facebook or Instagram, etc., it knows. But somehow it even understands you better and knows how to use your clicking better than other search engines. (Qwant is pretty good, and it doesn't keep a record of your searches, but that means it doesn't learn much about you.)

It's almost as if Google *abduces* what information and images you want. In fact, it is *inducing*, offering you a menu of choices that have the highest probability of being what you wanted to see. The creators of this code are so confident that they can anticipate your inner desires that they include the "I Feel Lucky" button so that you just go immediately to the most likely website they have chosen for your search parameters. And your "I Feel Lucky" button may take you someplace different than mine, even with exactly the same search terms.

Now, I can't make you as good at induction as Google, but you can learn how inclusion and exclusion, together, produce these results. The first step is that we must take what we have learned so far and see how valid *forms* of reasoning can be compiled and simplified. This generalizes our concept of validity –from the tight, parsimonious, etc., analogy between intensive and extensive inclusions in specific arguments, our minds grow to learn features that will help us understand validity in general.

You learned that a syllogism has a major term, (the predicate of the conclusion) a minor term (the subject of the conclusion), and a middle term. The middle term is the term that is transformed from a connotation to a denotation, from a conception to a concept, in the course of our reasoning, and then, having done its

work, disappears from the conclusion. The transformation is called “distributing the middle term,” which, as we learned means making a claim about each and every member of the class that is included in the reference of the middle term. That requires determining (defining) these members sufficiently.

You also learned that there is a way to check any syllogism to see whether it is formally valid, but I will now rephrase this procedure in light of the terminology we have learned:

1. The middle term must be distributed (be used distributively, as a claim about what holds for each element of a universe of discourse).
2. If the major or minor term is undistributed in the premises, it must be undistributed in the conclusion. That means that if we have not used a term with a universal quantifier in the premises, we cannot use a universal quantifier in the conclusion.
3. If there is a term negated in the premises, only a negative conclusion can be drawn. It does not matter whether the negation is universal (an E-proposition) or particular (an O-proposition), the conclusion must be negative if any negation appears in the premises.
4. Nothing follows from two negative premises, so one cannot use two negative premises in a valid syllogism.

With any properly formed combination of two premises and a conclusion (an argument) that does not violate these rules, that argument will be certain to be formally valid, which means that, as expressed in symbols, the premises *include* the conclusion. The following combinations of propositional forms provide valid arguments:

AAA
EAE
AII
EIO
AAI
EAO

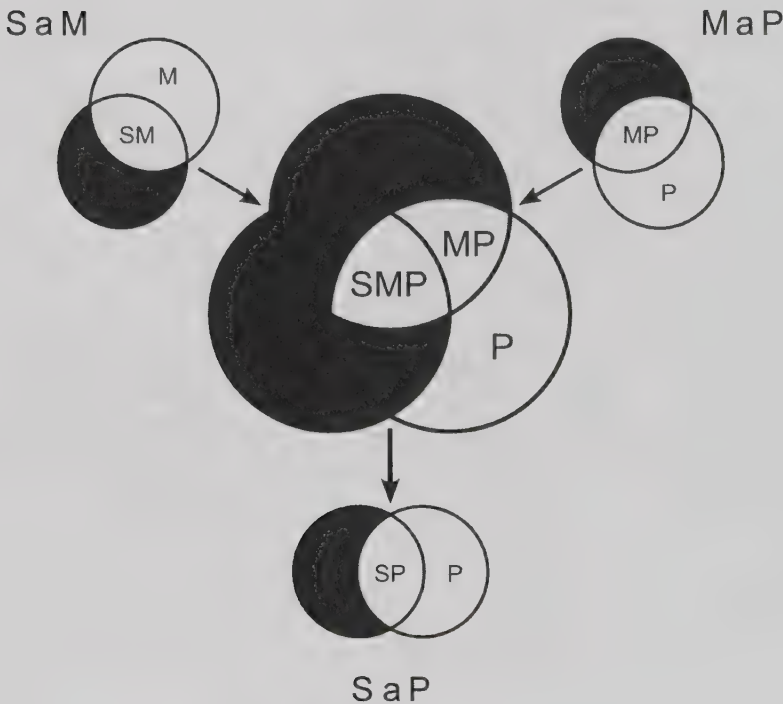
These all begin with the minor term. If the premises are rearranged, so as to begin with the major term or the middle term, the order of the letters can change. But there is little reason to rearrange the terms. It is easier to think about syllogisms if you keep the minor term first, the middle term in the middle, and the major term last. Sometimes one can be more persuasive by changing the order, but for the sake of clarity, we will always keep the terms of syllogisms in this order. Any other order also prevents clear and easy formation of a serial predication, which consists of chains of A-propositions.



Logicians have developed a number of ways of representing valid syllogisms. But unlike us, they usually put the middle term first. Take these for example:

AAA-1 Modus Barbara

$\overline{\overline{\exists x: Mx \wedge \overline{Px}}}$	MaP	All M are P,
$\wedge \overline{\overline{\exists x: Sx \wedge \overline{Mx}}}$	SaM	and all S are M;
$\Rightarrow \overline{\overline{\exists x: Sx \wedge \overline{Px}}}$	SaP	thus all S are P.



This is just four different symbolizations for an AAA argument, but these all begin with the middle term. It is called "First Figure." It's actually a little harder to think through than our way of doing it. In the diagram version, the shaded areas are excluded, the light areas are included. It helps some people to use these kinds of symbols. But the principle of valid reasoning is the same across all these forms of symbolization.

Most of the arguments where the terms are rearranged in various places in the syllogism (Second, Third, and Fourth Figures) are difficult to think through. There are 512 possible combinations of the letters and quantifiers, but only 24 are valid, and of those, really only the ones listed above are easy to think through. It is



generally better, for communicative purposes and for your own reasoning, to use the easiest forms. Further, the complicated forms can be reformulated as easier forms by substituting other expressions for those which are difficult to think about.

The difficulty in thinking these through relations is an intensive difficulty. To a machine or a computer these intensive difficulties don't matter. The machine can provide the requested output just as quickly for difficult-to-think-through thought-forms as for easy-to-think-through thought-forms. The machine does not need an argument to be elegant, only syntactically correct (we will get to this). It does not become frustrated when you ask it to perform unnecessary steps and tasks in achieving an output.

When humans mimic machines, they try to put out of their minds the need to think through the meaning of an operation and simply carry it out anyway. Thus, they will include and exclude according to some well-defined function they have been given, and bring that function to bear on the elements of the universe (the data) that have been entered into the UD. When you do this, you carry out an "operation," as we have learned. It's like taking one egg at a time and moving from the carton to the refrigerator egg-holder. It's mechanical, but delicate to behave like a machine. You are being like Google when you carry out operations mechanically. But you are slow and inefficient because it is difficult to be so literal-minded as to see every term as a collection of inclusions, at two levels, class and UD, and to see every defined function as separating, grouping, combining, individuating, and re-combining the elements according to the way they are determined by some relation.

For example, you probably will be able to sort out the horses that have spots from those which do not, although there may be some borderline cases. In this case, the function is spot-separating. But if you have a lot of horses and I increase the number of criteria for selection, you will quickly bog down. If I say: "here are a million horses. Bring me all of those born between May 6, 2014 and June 12, 2016, that have been trained by someone named Smith, Jones, Johnson or Benson, and that are hungry," you might find this a challenging request. But if you have a list of all the trainers, all the birthdates, and a feeding schedule, you can start with any one of those criteria and move through the lists rather quickly. Let us hope that the birthdates are listed chronologically, the trainers alphabetically, and the feeding schedule from most recent and going back. These are three different forms of order, but they are just a sampling of how data may be organized. Disorganized data slow us down more than it slows down machines, but it slows even machine processing.

Given the horse assignment, if you are a human being, you will want to sit back and reflect: "which list should I check first?" A million horses. If you check the feeding schedule, there may be a lot of hungry horses. Definitely we do not begin there.



Why? Because we want to exclude as many as possible right from the start to make our task more efficient. Surely there will be fewer horses among the million born during those two years than were trained by trainers with those names, common though the names are. Yet, horses are born in passels and crowds, many tens of thousands every year. Horses are *trained* individually. So, I will get the trainer list and start there, then move to birthdates, then to the feeding schedule for those not already excluded.

A machine does not have to form a strategy of this kind. It can search all the data for all the specified parameters and compile the output almost as efficiently as it can carry out serial tasks. You can (and must) tell it “first this operation, then this operation on the output, and then this third operation,” but you will get no significant improvement in speed by ordering the tasks from most exclusive to least exclusive, as we did in the example above. Processors are so efficient these days, that the difference would be mere nanoseconds.

Yet, those processors were developed from the very logic you are now learning. The machine does not need a strategy, it needs a data set and some parameters. All the machine does is include and exclude. It has no notion of purpose and its efficiencies are not quickly strained by the multiplication of parameters and operations. **But**, its exclusions are not a temporary “leaving aside” of something that might come back later. Its exclusions are extensive, not intensive. If a horse didn’t actually happen to eat at the scheduled time, the computer neither knows, nor pauses to consider the matter. That horse is on the list of those fed. So it isn’t hungry as far as the computer is concerned. You, on the other hand, might think to ask, “was every horse on this list *really* fed at the time indicated? And did they all actually *eat*?” I mean, you can lead a horse to food, but you can’t make it eat. And if there were exceptions, *you* might learn about it. You know the intensive meaning of “hungry” and you know that the horses on the generated list are *most likely* to be hungry, but that doesn’t mean all of them really are hungry, or that every really hungry horse is on the list. Look at you, doing inquiry, abducting, deducing, and inducing. You also generalize and include possibilities. The machine does nothing but gather the data that fall within the formal parameters. It mechanically excludes everything else. You couldn’t do that if you tried.

That is why *you* developed a strategy for grouping the horses using the criterion that would exclude the most horses first, and saving the harder work for later in the process, when there would be fewer horses to consider. If your task were more difficult than the one I made up, you can develop strategies for forming strategies, form a plan that takes each task in its overall form and groups tasks according to resources and available time. In fact, you do this sort of thinking all the time, for example, when planning your errands for the day, you think about what places are close to what other places, about which tasks will consume the most time and which will consume the least, and which can be put off and which cannot. It’s even



more obvious when you are planning a vacation or organizing a big conference for hundreds of people.

Computers do not need this kind of embedding of tasks within tasks for the sake of efficiency, but they do need syntactically unambiguous instructions about what data to group with what other data, and in what order. Sometimes it doesn't matter about the order of some tasks, sometimes it does. Sometimes it makes no difference how the data are arranged within their groups, sometimes it does. Sometimes your output will appear to fulfill your purposes but in fact excludes very important data. (You screwed up the program; but it did what you told it to do.) The fact that the program does run and produce an output does not guarantee it was the exact output you *wanted*. Sometimes a command you gave or failed to give will alter the inclusion and/or exclusion of data that occur.

Here we have *extensive exclusion*. That is, some feature (or bug) in the symbolization process has led to an unanticipated (and often unwanted) exclusion. An unwanted *inclusion* is obvious, easy to detect, usually easy to correct, since you have the included data *before you*. But an extensive exclusion may be very difficult to identify, and unless you catch the "error" somehow, you do not know it needs to be corrected.

Extensive exclusions occur in daily life. For example, you may be standing in front of a group, thanking a list of people and accidentally leave out someone who really must be included. And you may not notice your oversight. And perhaps no one will correct you. In daily life, we apologize, state that our purpose (intensive) was to include that person, and we try to set it right by making these intentions known to whoever was affected.

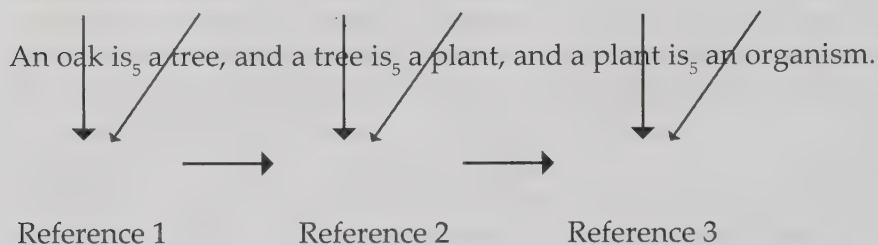
We humans cannot add very many parameters and levels or generality to our intensive thinking without increasing errors. So, what happens when you reach a point where no further parameters can be processed? We start writing things down, or, if that gets too cumbersome, we devise a mechanism –a symbolic system of relations that allows us to compile and batch information. Books do this, sometimes according to narrative form, sometimes lists (like the phone book – remember those?) sometimes in categories (like an encyclopedia), and so on. Once something is in a book, it is difficult to change it, which is why some books contain lists of "errata and corrigenda" in later printings. But at least one *can* correct whatever was accidentally excluded from a book in a later revision.

Machines are different. A machine cannot and will not go back and compare its operations with some intensive relation that was left aside. You can write a subroutine to check later what was done earlier, but the machine includes whatever the code tells it to include, and it excludes everything else. Now, Google and other search engines hold an almost unimaginably interconnected web of extensive relations associated in such a way as to mimic human inference, and it even



appears to be replicating chains of references as we have learned about in serial predication.

Remember this:



This chain of references includes (for Reference 1, 2, and 3) the *names* you chose from your background of experiences and your effort to name what the denotation-copula-connotation complex *felt like*. Those names are actually just complex webs of intensive associations (and dissociations) from your memory and experiences. Google has a web of *extensive* associations (and dissociations) that emulates that background, creates an analogous structure, but the *associations* are extensive rather than intensive for Google. And the dissociations are just a record of unselected stuff in your search history. Google does not guess by feeling this background (abduction) and producing a name, it operates by performing millions of sub-operations almost instantly.

You are more intensively complex than any program or programming forms, even when combined in almost infinite layers. But Google is more extensively complex than you can imagine. It can produce results unanticipated by its programmers. Can it “learn”? Not intensively. It has no intensive processes. But the way it compiles past experiences into present results leads *us* to feel like it “knows” what *we* want to do. The intensive aspect of this interpreting is wholly ours, but the *effect* the program can produce is undeniably astonishing. There are many programs far more astonishing than Google, but let’s just say Google sets a public standard for extensive excellence in inclusion and exclusion that we can all acknowledge.

What does this have to do with syllogisms? Well, a great deal, actually. You see, Google takes your search term as a “character string,” as if each letter/number/punctuation mark you used, and the order in which you used them, was a serial predication. It conjoins them, compares them with other closely associated strings, and then hands you a conclusion –the I feel lucky button is its *best* “guess.” Then it includes near misses ranked in their proximity to your character string, based on your history of selections (and what you ignored, i.e., excluded). But it supplements this by a formula of interconnection –the more a given address is linked to other addresses, the greater the likelihood that any given individual wants just that site. So it generalizes as well as individualizes. This part is induction, and it is highly fallible. But the deduction is the syllogism:

If this, and this, and this, and this, and this . . . then that. Now, if I stuff all those middle terms into one big denotation, and retain my first proposition and my last, I have a big Direct TV commercial, but without the weird (overly specific) inferences. Yet, somewhere deep in the list of 20 million hits, you might find the Turkish bath and even meeting Charlie Sheen. It's included as being consistent with your character string ("when you're unhappy, you go to happy hour" . . .), but rather unlikely to be what you wanted when you created that string "what do I do when I'm unhappy?" Yet, you can create interesting syllogisms by going deep into the results of any search engine.

You should try it. In fact, I insist on it.

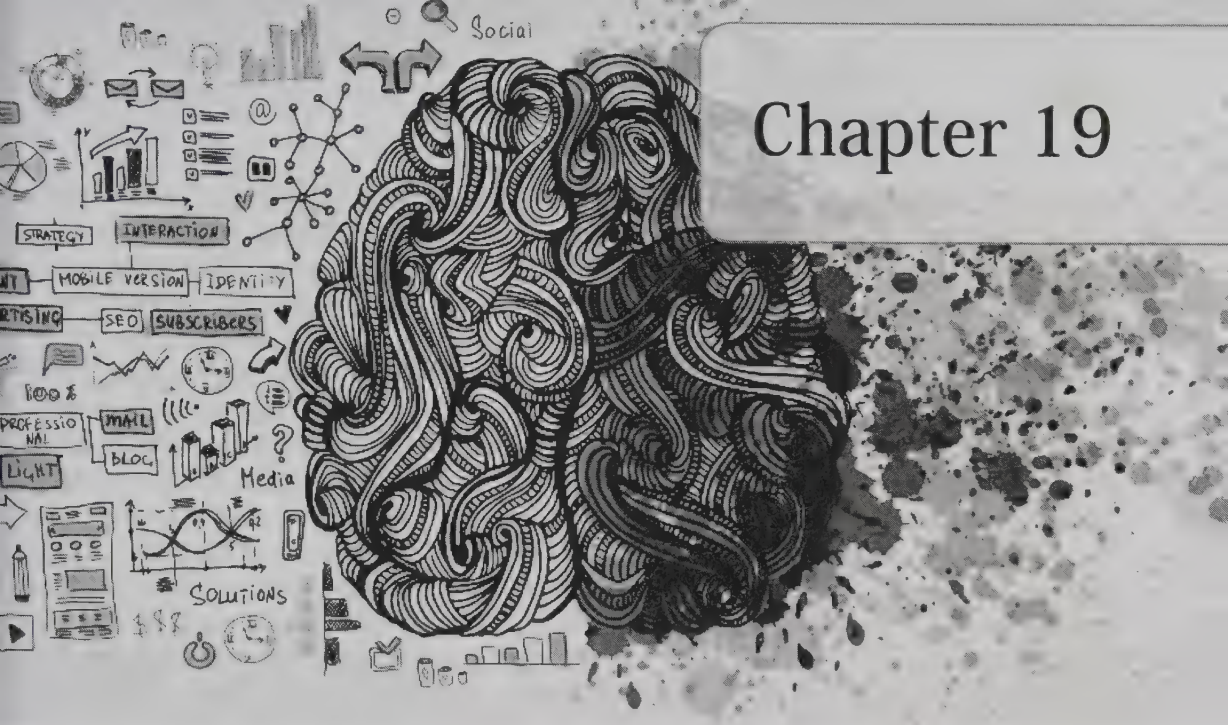
EXERCISES:

You need a partner for this assignment.

1. Choose a search engine other than Google (e.g., Yahoo, Safari, Explorer, Bing, Qwant, etc.) and type in a simple character string –four or five letters at most. Record the top three results (the name of the websites and paste in their urls).
2. Type in the same term to Google. Record the top three results (again just the website name and the urls).
3. Send *just* the urls (there may be overlap in the lists, e.g., Wikipedia), **not the character string**, to a homework partner, in two sets, two lists of three urls. Do not identify which set came from Google and do not tell your partner which search engine you used other than Google.
4. Take the urls you have received from your homework partner and create a syllogism. The major term (the predicate of the conclusion) will be your best inference as to **what character string** your homework partner chose. Your minor term (the subject of the conclusion) will be the words "the character string," and connected by "is_s" (identity). The middle terms should be lined up (use the urls) in the order of their importance in helping you find the character string.
5. Set out these middle terms as a serial predication (it should have six middle terms). Name them the way you would name a reference, using denotation, connotation and copula.
6. Send your syllogism and serial predication and reference names to your partner, who will determine which url's were Google and which were not, and the order in which they appeared in each search: label them G1, G2, G3 and (for example, if you choose Yahoo) Y1, Y2, Y3, and send them back.
7. Reflect on the results and write a short paragraph on what you think may have been **extensively excluded** based only upon what you see extensively included.



CHAPTER 18



Chapter 19

UNIVERSES OF DISCOURSE

Reminders

You learned to form a Universe of Discourse (UD) some while back. I used the analogy of the corral and the barn. Before a horse could get into the corral, it had to be in the “barn.” That was a metaphor for **class membership**. We will get more detailed about how classes work in the next chapter. For now, just imagine the barn. There are *ideas* are roaming around in the world of mental entities, but when they are rounded up and led onto Rancho Logos, you assign them to barns. While there, we call these ideas “conceptions,” vague associations of possibilities that you may call on when conversations do not have to be very precise. We discussed the process of moving from conception to concept in chapter 12.

These conceptions may be called on as predicate terms in a proposition, providing fields of connotation, but there is no reason



to use one of these terms as a formal predicate *unless* you are *prepared* to make it into a *fully* determinate *concept*. The rule is, therefore, that all horses in the corral (the UD) must be fully determinate concepts –you know the core essence, whaty makes it just that concept and no other— even if they are not being called upon in their fully determinate form in a given proposition (in other words, just as predicates and never as subject terms at the moment). In the UD corral, they are already wholly determinate and ready for use as either subject or predicate terms in a proposition. Otherwise, they are still in the barn. Thus, you have also learned that getting a “horse” from a conception, a member *in a class* into a UD involves “concept” formation.

But now we need to say something about what *really* happens when we transform conceptions into concepts. I have used the metaphor of “training” (as in training horses) for this transformation, and the analogy is a tight one. The transformation brought about in a horse by “breaking” and “training” would make a person wonder whether it is even the “same horse” on the far side of the process. The answer is, with horses as with the relation between class members and elements of a UD, “yes and no.” The differences are more important than the similarities, for our purposes.

The way we can work with fully determinate concepts is quite different from what we can do with conceptions. You can *ride* a concept and make it do tricks (prancing, jumping, racing), and, more importantly you can make it do *work*. You can’t do that with class members. They are too vague to ride, too unruly for tricks, too undisciplined for work. But in a crucial sense, *that* is the “real” horse, that vague, unruly, undisciplined one. When you train such a beast, it takes patience and a willingness to tame, to change it, make it less than it was, take the beauty and wildness away from a conception.

An Analogy

Take the *idea* of “god.” (I have not capitalized it on purpose.) As an *idea* it is older than recorded history. In many ancient cultures, there were many gods, and they ruled various aspects of life –the seas, the skies, the winds, the mountains. These are like forces of nature, to us, but to those people long ago, the forces *were* the gods, and vice-versa, identical, is₅. Or, the gods might also bless (or govern) certain cultural activities, like navigation, or the hearth, or the grain, or the wine, or the harvest, or the planting. Every culture has its own ideas, although some are quite common across cultures. In later times these gods may coalesce around moral ideas, such a love, or judgment, or justice, or mercy, or compassion –perhaps even revenge, conquest, victory, fate, or the like. (What do you think you’re doing when you say “Go Cardinals!” apart from calling on the powers of a totem animal to deliver victory over, say, the Cubs or Diamondbacks or Bluejays or Tigers?)

The point here is not to catalogue or prove anything about religion, only to bring out something you already know. As an *idea*, “god” is a sort of free-for-all competition of wild ideas. As the idea is herded toward “reason” (Rancho Logos), the commonalities across cultures are emphasized and the differences minimized. By the time we get to the various barns, say Judaism, Islam, Christianity, the Hindu disciplines, Daoism, etc., the idea has moved into a broad collection of *conceptions*. Obviously, not all Jews, or Christians, or Muslims agree *within* their own faiths about how to *think* about their own conceptions. And so, we find differences between, for example, the God of Roman Catholicism and that of Southern Baptists; the God of Reform Jews as opposed to Orthodox Jews, and so on. Some might even want to say these aren’t even the same barn. However that may be, you see that if a Baptist and a Catholic want to understand one another, they must be very clear about what they say “God” is (both will capitalize the word, but that isn’t true of every religion).

That transformation (conception to concept) and effort at communication is no small matter. It is very difficult and painful to include and exclude exactly the right constituents. After all, not all Catholics agree on how to do it. St. Francis and St. Thomas Aquinas really may differ, just as Roger Williams and Billy Graham differ among Baptists. Those differences among those who *share* a conception must remind us that when we lead a conception into being a concept, we leave aside (intensively exclude) many important aspects of the conception. We do so for a purpose, but it can be painful to exclude important constituents in order to serve the effort at achieving a goal, no matter how lofty or mundane.

Making a Commitment

But when you have a concept, you are committed to working with an element in its *determinate* form. After you have made the concept fully determinate, the further effort is to make that element, and the other constituents you have led into your UD (which are also elements, made visible by the act of specifying a relation), *operate* together. You may use universal quantifiers for these operations (All and No), as well as existential quantifiers without fear of exaggerating your position, since you have excluded in advance all the meanings that are not under current consideration. It is like having a finite number of cookies on the cookie sheet and discussing how many are burnt, as we learned earlier.

We have seen that certain relations, such as “south of” or “to the left of” or “loves” will line up the elements as “terms” in many different ways. We have also learned that all relations are ways of saying “is,” and we have learned to select the best sense of “is” for our inquiry. These related terms (two or more) provide us with a basic unit of reasoning called “propositions,” and we have spent much effort understanding what a proposition is, as a thought, as an assertion, as a combination of denotation, connotation, and copula, converging on a reference,



and as a premise.

We have learned that we can conjoin, disjoin, or negate such propositions, and that when we treat some propositions as premises, by conjoining those premises as implying a conclusion, we can form an “argument.” We learned that the argument is “cogent” if it *includes* the conclusion, intensively. We learned that the argument is elegant if it is simple, clear, tight, and parsimonious. Most importantly, an argument is “valid” if what is intensively included in our reasoning is closely analogous to what is extensively included in the actual *expression* of that argument, as understood by others, and as being asserted for their possible action. We lined up our mental references (the succession of beasts) to lead to an *inference* we have made, that then becomes the primary *implication(s)* of our expressed case.

In the course of our overall inquiry, we have paused to test our deductions by comparing our chosen path of reasoning to established *forms* of arguments, and we have noted various ways that these forms may be symbolized. We have discovered that symbolizing our thinking runs the risk of excluding what we *needed* to include, where the symbols are communicated across generations and among living people. The deductive part of our inquiry must therefore be tested, assertions made experimentally, to see whether our processes of interpretation and judgment, from abduction through concept formation, through formal symbolization, can stand up to criticism and can function. We have recognized that constant revision and improvement of our deductive phase, or if necessary, starting over with a new abduction, is called for.

There is nothing easy about all of this. And yet, there are only a few things we have not yet learned to do that are crucial to achieving excellence in our thinking.

“What the hell?” you will say. Yes, and all that, but it’s going to get worse before it gets better.

The reason is this: I told you at the beginning that logic was really the process of disciplining our active thinking according to reflective norms. You had forgotten that. It’s forgivable. You have slept many times since I said that. But I wasn’t kidding. Now you say, “dude, what does it even mean?” OK, I will tell you, but you won’t get it until I show you. Here is the answer: The norms of reflection are best learned as *forms* of reflection, and they answer the question “how do I know what I *should* include and what I *should* leave aside in forming an idea into a conception (that is the next chapter), and a conception into a concept (that is this chapter)?” The key word is “should.” You want to do this well, not poorly. Your purpose provides the context for answering the question “how *should* I do this?” but you also have to formulate your purpose.

The conclusion of your argument is the formulation of your purpose. If you have done your thinking well, it is intensively *included* in your premises. You have learned how to carry out this process. And you have a list of norms, namely cogency and the elegance factors, that help you check your work. But these are norms for *judging* the quality of your “active formulating and expressing” the thoughts you already have in your UD. If you lined up your elements well, according to the relations you chose, formed them into good arguments, and expressed them well, there should be validity in what you have thought and in the way your thinking is understood by others.

These norms do not address how you can tell better from worse processes for getting from conception to concept. I showed you examples –the wedding, the cake recipe. There are norms for such work –my favorite guy Whitehead calls them adequacy, applicability, logical rigor, and coherence. That would be an interesting discussion we might have . . . some other day. But now you must learn the *forms*, and these are reliable forms of manipulating inclusion and exclusion, while we transform conceptions into concepts. That will be enough.

How *should* we work with elements of a UD *as* expressions of membership in classes? I am aware that you have no idea what that means. So, in plainer terms, you are thinking about a vague class of things, open-ended, and you are not sure what’s in and what’s out, but you want to work with what you do have. You can always go and gather more information to expand your understanding of the class, but at this point, you need to work with what you *do* know.

Your Final Paper

This is like that moment when you sit down to write the research paper. You have a massive swirl of information in your head and maybe a pile of books and articles on your desk, and about 27 tabs marked on your computer, and perhaps even an outline of what you want to include. You *know* this feeling. The blank screen is before you. It’s time to . . . well, do something or get off the pot. You want a good paper, right? You know you won’t be able to include everything you researched. You must choose, and you must arrange, and you must leave aside, and . . . what? Produce a piece of writing that is cogent (hangs together on its own terms) and is, you hope, elegant (simple, clear, tight, and parsimonious). There’s your A, right? It’s a challenge.

Let’s go back to your outline. If you haven’t made one, you had better do it. If you just charge off into writing you are relying on luck, the muses, God, pure talent, or some other intervention you have not really earned, you might get what you wanted and you might not. So now, looking at the outline, you begin to rearrange, to put this part here, add that part, cross out that other part. I know you have gotten into writing a paper and you realized you have to change your conclusion. That



really sucks when that happens, because you may end up defending a conclusion you don't even really believe just to get through the process. Your thinking wasn't cogent, and you didn't realize it until you tried to conjoin your premises, and then it dawned on you that they include a different conclusion than the one you had made your purpose to assert and defend. I hate when that happens.

But *why* does that happen? Look at that outline. It's a god-awful mess. And your thinking is an even worse mess. That outline looks coherent compared to the chaos swirling in your mind. You know all of this. It's not hopeless. You just need some step-by-step inspiration.

What Chaos Can Do for You

I have good news and bad news. First the bad news. Your thinking will probably always be like this. No amount of "discipline" from learning logic will change it very much. But now the good news: it's not a bad thing to have a chaotic swirl of stuff in your mind. We will talk about this more in the next chapter. There is much more order in that chaos than you realize, but you have to learn to get at it and use it. And we will do that. But right now, I have to convince you of something else. There are *forms* that logicians and mathematicians have discovered that help you transform class members into elements with as much control as possible over what is included, and what is left aside.

Playing the Peano

These forms are simple enough for you to understand and work with. They are called "set-theoretical operations." The system of these and their detailed relations have been studied for about a hundred and twenty years, beginning when an Italian mathematician named Giuseppe Peano (1858-1932) invented the idea of "class membership," which he symbolized with the mark: \in . We learned this symbol in chapter 17. Peano did not make a distinction between class membership and the elements of a UD. Other logicians did that later, after a lot of arguing. I am using Susanne Langer's way of doing this, but I'm also doing it my way (not exactly hers). We learned about her a good while back. Class members and UD elements can be distinguished in other ways, for other purposes, but my way is good for you and for introductory logic.

The operations I will teach you in the rest of this chapter are also important as principles for programming computers. The various computer languages, from early machine language to Basic, Cobol, and Fortran, which could be coded and run on punch cards, to more common languages today like JavaScript, are what I'm talking about. Wikipedia lists over a hundred programming languages, and you know very well that they were created by different people for different

purposes. Some languages are better for some things and some are better for other things. These languages are built from processes of inclusion and exclusion, but also grouping, compiling, sorting, enumerating, ranking, sequencing, summing, batching, collating, and a dozen other basic operations that enable us to arrange information according to our purposes. The most important is, perhaps, iterating, which enables us to automate tasks humans find monotonous.

Morris and More

When you are working with a UD, everything you do depends on a previous act of inclusion. You included the elements in your UD, and you did so at the cost of leaving aside many other things these elements might mean (their full conception), or might be used for, in some other process. You also left aside many conceptions, altogether. They are back in the barn (in the class), but you decided you didn't need those conceptions at all. These decisions have consequences. They can be made well or poorly. I will teach you how to think of them better in the next chapter. But the *strategies* for that thinking are in this chapter. The task for the present is to learn the general forms of their operations and uses once they have been transformed –that is to say “formalized.”

Fully determinate concepts can be treated according to the three general divisions of signs introduced by Charles W. Morris (1901-1979), who was a student of (the unfortunately named) Delton Thomas Howard at Northwestern University, from whom we learned serial predication in this book. Morris became much more famous than his teacher, and we still use many of his ideas today. One of them is this:

Syntax
Semantics
Pragmatics

You know these terms, vaguely at least. You know that if a computer cannot process your command, it may say “syntax error.” That means that you have not formed your command according to the pre-determined rules of the computer language. The semantics is the meaning of what you told the computer, but it can't process even a meaning it *should be able* to use unless the command is framed in a syntax that it “recognizes,” that corresponds to the parameters and conventions of its programming. (Computers do not really “recognize” things; that is a metaphor.)

When you carry out operations in a UD, you are working with the generalized form of all computer languages. The inclusions and exclusions have already been set by the language that governs the computer. If it uses more than one language (and almost all of them do, except for the earliest computers that used machine language), the languages will be embedded within one another, with each broader

level governing the more specific languages it enables.

When we get to class membership, in the next chapter, we will be discussing the broadest possible parameters for such a relationship between the world of real-time processes and the virtualized world of conventionalized communicative processes. For now, we want to understand the principles of getting a semantics (the meaning of your elements) and their arrangement for a purpose (the syntactical limits and permissions) into seamless operations. That is easier than it sounds because a very few principles govern many, many operations.

Semantics

The meaning of your elements must be restricted to just those which can be operated on (processed) by your syntactical limitations (exclusions) and allowances (inclusions). The good news is that you already know the three operations you need: conjunction, disjunction, and negation. What you have already learned is that we can line these up as an “argument” by conjoining the “premises” and making them “conditions” for the conclusion—they are supposed to *include* the conclusion in some way.

I can now reveal (it won’t surprise most of you) that a conclusion is the *output* of a process. If you get the output you wanted (your purpose), your program “ran successfully.” There is a reason we chose the criteria of “success” and “failure” for *assertions* way back in chapter two. Programs succeed or they fail. They are not true or false. They are attempts, endeavors, to achieve an end—an output. That end or output is a conclusion, and you must formulate it as a proposition in order to get it as an output of a process. Your reasoning is infinitely more flexible than a computer’s operating protocols, but there is a close analogy, in result, in these processes. The *way* they occur is very different. We are not machines.

Still, we must simplify and mechanize the operations in order to get a machine to carry them out. There will be no swirling chaos in the programming of a computer. The syntax is like the outline for your paper, but it must be much tighter than the outline you sketched. It has to have well-defined limits and allowances for all the elements. The elements need to be uniform in their level of generality, for each level of the UD you are operating on. You can put corrals within corrals within corrals in your UD, but every horse must pass through the bigger corrals to enter the smaller (more specific) corrals. If you have horses jumping fences, you’ll get syntax errors. In other words, your computer will not be able to make the “inferences” you planned for it. (To the computer, these are implications, and it actually knows nothing of your inferences—nor does it care). Hence, it doesn’t really make inferences. That is a metaphor, but it successfully runs (organizes the data) according to your purposes.

So there is really a small set of operations that govern the sub-operations of smaller



UDs. You may now be thinking of the “operating system” of your computer (not to be confused with the “platform” or the “environment”) which are smaller corrals embedded within the operating system. I mean that you may be thinking about MS-dos, or the latest version of the Apple, or Unix, some major-league piece of programming within which *other* programming is done. But that isn’t what I am talking about. I am talking about the principles used by *all* of those operating systems. It is much simpler and much more general than the incredibly detailed work of creating a computer operating system. That is also good news.

This level of generality of the UD has an interesting name. It is called “formal logic.” Some people call it “mathematical logic,” but that isn’t quite right. We will learn what is truly mathematical (algebraic) about logic in the next chapter. The operations that enable us to give commands to our computers in the quasi-language of programming is the regimented English of propositions, with their meanings included in forms that can be represented by capital letters, A-Z, and if we have more than 26 Propositions, we can add letters (AA, BB, etc.), or we can adopt some other convention for representing our “constants.” We have adopted the convention of expressing the relations internal to these propositions with lower case letters.

So we might say “San Francisco is north of Los Angeles” by the schema SF n LA. We might generalize that relation as “S is₇ L.” This will help us express serial relations and variations in the meaning of “is,” and to name references (in order to track our thinking). But in the UD, the entire proposition, “San Francisco is₇ (north of) Los Angeles” becomes “S” (or some other constant we specify). Thus, we have indicated the whole meaning of that proposition –including the well-defined concepts of “San Francisco” (with its core essence), and Los Angeles (with its core essence) and “north of” into one symbol: S. (I have chosen “position” as the core relation, is₇, but the choice depends on our purpose, as you’ll see in a moment.) And there it sits. S is ready to ride, or work, or do tricks.

Here is its first trick:

$S \in UD$

You now have a nice, well-defined compound *semantic* unit, which is what an element must be, in a sense, because the core essence of a concept is always complex. This one is complex, in that it consists of a proposition with two terms and a relation to make them visible. But all elements are complexes of constituents which make up their essential core. As an element, S has been *analyzed*, then generalized and schematized as an upper-case letter. That may look pretty simple. It took a lot of work to get that S, friends. But now we may need to name the UD, so that we know which corral we are in. To do that we need to *compare* (not contrast it) it to the class we drew those elements from. And we won’t do that until the next



chapter. For now, let's use a variable:

$UD = x$

The x has some yet-to-be-determined general relation to a class.

So now we say: $S \in x$.

Stop snickering. Yes, I see it. Who the hell do you think is writing this book? Some saint? I think not. This says "S is an element of some UD."

What else is in this UD? Is it Drugs and Rock and Roll? Maybe. There was a lot of that in California in your parents' day. It may be the main reason you're here, but we'll leave that aside (see how useful intensive exclusion is?). And what *isn't* in the UD we called x ? Lots of stuff, right? Like whatever they were doing in Tennessee, which involved rock and roll, since it started there, but not much in the way of drugs or, well $S \in x$ (since that has to do with the position of cities in California). But what else?

Oh hell, look at this: "Tom lives in California." Do we want to put that proposition in the UD? OK, let's try it.

$T \in x$

Another nice clear semantic unit, but a second relation "lives in" which would be is_4 or place. Some might say living in California is a condition (is_8) or an action (is_{10}). It depends on the purpose. You can see that we *really* need a name for this UD now, something reflecting the purpose of the inquiry. Things are getting squirrely because we now have (at least) two senses of "is" and Tom is an individual, California is a state, and the other two elements are cities. These are different sorts of horses.

Without a purpose, these elements, and even random propositions made from them, will just graze around the corral. We could call our UD "Where's Tom?" or "Tom's Place," but behind every purpose is a *norm*. We'll call the inquiry "Find Tom" There is something here to be done that could be done better or worse, could succeed or fail. We want to find Tom. If we find him, we succeed. If we don't, we fail. So our UD, which was x above, is now:

$x = \text{Find Tom}$

Do we have the needed elements in the UD to find Tom? What is your opinion?

I think it depends on how close you need to get before you declare success in finding Tom. If finding which state he lives in is enough, it's easy. But what if Tom

is traveling? What if he is not stable and moving a lot? We are pretty much going to fail. So we need to be sure we are aware of our limitations here. Assuming Tom is at home, and that he has a more or less permanent home, how much further can we go?

The answer is that we need some procedures, instructions, a little step-by-step. Having semantic units, combinations of meaningful propositions made from elements in our UD, is not enough. There are ways to put them together and ways you can't put them together, at least, not if you want to *find Tom*.

Syntax

We skipped the full defining of the proposition about Tom and California, but we must be *prepared* to do it. Now look what happened. We took apart the elements (two more denotations and a relation), and we are looking at four denotations (SF, LA, Tom, Cali) and two relations (two senses of "is" –north of and lives in) and we have only the information that *all are elements*.

UD = Find Tom

T = interp. Tom

SF = interp. San Francisco

LA = interp. Los Angeles

CA = interp. California

n = interp. "is north of" (is_7)

l = interp. "lives in" (is_4)

I place the abbreviation "interp." before each item in the schema to remind us that other interpretations can be provided, and recall that each term can be refined. So if someone wants to know whether I mean the metropolitan area or just within the city limits, we can add that to the interpretation. After all, Tom might live in Reseda or Walnut Creek (suburbs of LA and SF). The same holds for the sense of "is," which can be refined or changed, so long as the changes are in keeping with the purpose of the inquiry.

So we have a bunch of pieces. What can we do with them?

There is a rule called "compositionality" that we will get to in a minute, but right now what you know is that you can make propositions using any of the pieces, but they have to be meaningful, and that usually requires a subject, and a predicate, and a sense of is. What propositions can be formed with our pieces? You will see there are many.



There is a formula for this. Take the available terms (4) and raise 2 to the power of that number (2^4 , since these terms might be either subjects or predicates, so *two* places they might go). You will see the result is 32. Now multiply that number by the number of relations in play (2). We get 64 combinations of these elements that have a shot at being meaningful. Not all of them will be. "Los Angeles lives in Tom" seems like nonsense, but maybe in the sense of "you can take the boy out of the city, but not the city out of the boy"? So maybe. That is part of the conception, but not of the concept in this case, since it is irrelevant to: "Find Tom." Change the meaning of the UD and it might be important that Tom is always in California in his heart. How about "California lives in San Francisco"? (Just re-arranging the available pieces, mind you.) That is a real stretch. On the other hand, "Los Angeles lives in California" requires a metaphoric looseness. But there are still more combinations of elements than we can really process quickly. We need a strategy.

Some of these candidates *can* hold at the same time, some *must* hold at the same time, and some *cannot* (meaningfully) hold at the same time. In every case in which "Tom lives in Los Angeles" holds, it *includes* "Tom lives in California." Why? This is driven by the semantic relations. The meaning of the two cities is included in the meaning of the state. The inclusion is geographical, historical, and substantial (they *exist* this way), and indeed, is a part of the identity of the two cities. This is **strong semantic inclusion**.

Does this remind you of a certain Mr. Square? It probably should. But now whole propositions are represented by a single letter. With Mr. Square, we assumed that "is" had the same meaning for any group of AEIO propositions. It isn't exactly the same here, since the meaning of "is" can be a moving target. But it isn't an accident that implications similar to those held in Mr. Square keep appearing. These implications also look like the comparisons and contrasts we learned. It is all inclusion and exclusion at some level. Mr. Square's day is coming.

The meanings of "is" play an important role in determining what relations hold within a given UD (the can, the must, the cannot). Add a relation, everything may change. Take away a relation, everything may change. That is why we need to have our UD settled before we begin our deductive work. "Settled" requires that the meaning of each element is *determinate*, and, when a proposition is *serving* as a term in a related pair, the meaning must be *definite*.

Returning to our example, then, we have a problem, and you know it very well. "Tom lives in California" **can include** "Tom lives in Los Angeles" or "Tom lives in San Francisco," or maybe both (if Tom is rich enough to have two residences). But it can also include "Tom lives in San Jose," and SJ is not (yet, at least) in our UD. Maybe Tom does not live in either SF or LA, so our element "S" (SF n LA) is



irrelevant to our proposition “T” in such a case. You know from your hard work in forming S exactly what it means –the semantics. It is about *position*. So, if Tom wants to go to SF or LA, it could become relevant. It isn’t utterly *irrelevant*. Besides, Tom might decide to move.

How can we capture the fact that our UD, the purpose of x (Find Tom), has this difficult relation between S and T. Answer: we analyze and generalize. What do you think the following means:

$$(Sx \cdot Tx) \vee (T \notin x)$$

Will that command run? What did we tell the machine to do? Contrast it with this:

$$(Sx \cdot Tx) \vee \sim T$$

These are different ways of trying to tell the machine to ignore Tom unless he lives in one of the two cities included in S. But neither one will work in communicating with the machine. The simple reason is that the negation function is, semantically speaking (we will get to the syntax later), either too broad in *scope* (in the first one) or too narrow in *scope* (in the second). Sometimes, semantics can spoil syntax; but you should never give it a chance to be ambiguous.

Too Broad

This section is boring and difficult. You won’t get it until you finish both this section and the next section, and then begin to read into the section after both of these. Sorry about that. Stick with it and trust me. In the first case you only defined T for the UD, meaning it is included, and then said it isn’t included under some condition you haven’t clearly specified. *You* know what you mean, but the machine will not be able to guess. It is stupid. It needs more information.

It wants you to do something like this:

$Sx \cdot (T \vee \sim T)$, we can expand (SF \cap LA) and, either we are including Tom with S, or we are not.

Therefore we have two options:

$(Sx \cdot T) \vee (Sx \cdot \sim T)$, Option 1 is We are talking about S and that includes T, and if so, Tom must live in either SF or LA. Option two is We are talking about S and that does not include T (even though he lives somewhere in California).

Thus, we know our task. We must either check all of SF and LA to see if Tom is living there, or we find Tom and check to see if we are in SF or LA. Let’s choose. We must carry out that task in order to have T in a sufficiently determinate form



to continue with *this* reasoning. Let's say we did that, and this is what we found:
 $\neg(Sx \supset \neg T)$ This expresses that Tom was located in either SF or LA (or both), and that we thus know T is included in Sx –is semantically determinate in relation to the first proposition. But we cannot just say $(Sx \supset T)$, because that leaves open the possibility that $(Sx \supset \neg T)$ is also the case. Our original two options were:

$$(Sx \supset T) \vee (Sx \supset \neg T)$$

Remember Disjunctive Syllogism? The most useful rule in talking to any computer? You need to eliminate one option.

$$\begin{array}{l} (Sx \supset T) \vee (Sx \supset \neg T) \\ \neg(Sx \supset \neg T) \\ \hline (Sx \supset T) \end{array}$$

What does that say? It says T is in our UD and S is in our UD, and they have some relationship, but whether that relationship is "lives in" or "north of" will require more work. Remember how many combinations of elements were possible? Four terms, two relations. Right. Would you believe you have to work through all of them to finish this problem? You need a strategy, don't you? (Remember the last chapter? Feeding the right horses?) You'll get a chance.

So why does the computer (and possibly any human who hears you assert the same words), need the same explanation? We said either Tom is always with S (included in) or is never with S (is excluded from). We then added that it isn't the case that Tom isn't always with S, so he must at least sometimes be with S.

We still don't know where Tom is. That is what I mean by "too broad," but at least we took a step in the inquiry. What did the computer hear? It only heard "include T with all S operations." It doesn't care about the argument, it only needed to know that T has to be dragged along with every S operation, so it comes to saying "don't dump T, I may need it."

When? Well in case Tom lives in SF or LA, or wants to go there, since we know he is in the vicinity. I will need to define the proposition T more precisely if I want to use it in a more determinate relation to S.

"Tom lives in California," then, as it was presented, was not semantically adequate for our UD, with purpose *x*. We had to work on it. And there is more work to do. I can enumerate all the relevant cities of California as a long disjunction, and I can also define the rest of the relations of position. As you can see, "north of" is limiting, but it can be arranged in a disjunction by "fudging" a sub-order (say, alphabetical) for cities at exactly the same latitude, or of overlapping latitudes, and I can reverse

the whole list with a simple command by changing the relation to “south of.” Since I have arranged the sub-order “fudge” alphabetically, the “south of” command will probably present the overlapping latitudes in reverse alphabetical order. But it might not, depending on whether the sub-list is presented as a block or a sub-list to which the same command applies iteratively (“distributively” in our earlier language). That depends on the syntax of computer language.

If I want to add the relations “east of” and “west of” as well, I will need sub-routines for this pairing of orders (they are a pair because they have to be defined together), and I will need to decide which of these groupings is to take precedence when both are in operation. (Do we operate over the east-west list first, or the north-south? Do we coordinate the list by city names or by longitude and latitude coordinates?) Machines do not think. They mimic thinking. You either have to tell them every little thing, or you have to define a more general language of operations, syntax and semantics, in order to *use* them (which is what Morris means by “pragmatics”).

Do you see how this is starting to look like our strategy for feeding the horses? But it is adapted to a new problem. And again, the computer doesn’t need it. It needs semantically adequate elements. It doesn’t get burdened quickly with repetitive operations, but it can’t work with under-determined terms.

Some Rules

So, what are the most general rules for UD’s?

1. Logical rule of **formal context**: Every syntactically correct combination of elements in a “formal context” (UD and class taken together) yields a proposition. These propositions may consist of other propositions.
2. Logical rule of **meaningful relation**: Every element in a UD that is a member of the relevant class (C) *can* serve as a term in the propositions generated by the syntactically correct arrangement of the constituents of a formal context, enabling one to judge whether the proposition is meaningful.
3. Logical rule of **compositionality**: the meaning of logical constituents determines the meaning of logical relations. (Even though the relations make the terms visible as terms, the meaning derives from the terms, not the relations.)

These three rules, taken together and followed, express in the most general way that has to be respected if we want to ensure that a proper relation holds between our class and our UD, and that everything in the UD is sufficiently determinate for use in our reasoning, our “processing.” Thus, these are really “norms” that govern every UD. It is how we should think within and about the UD, if we wish to think



well. The UD is where all the operations occur, and this is where we mechanize our thinking, and our forms of expression *of* that thinking (in symbols), so that whatever else we do, we never have to worry about discovering something like this:

$$(Sx \cdot Tx) \vee (T \notin x)$$

If we do not know that $(T \in x)$ holds, we cannot work with it. If we know that both $(T \in x)$ **and** $(S \in x)$, then every syntactically correct combination should yield a proposition of some sort, and from there it is a question of arranging their relations, for meaningfulness and purpose (of the inquiry) –that is, which propositions include which, and according to what limits and permissions (of meaning). All of these limits and permissions are expressible and arrangeable as combinations of our three logical operations: and, or, not. We need “punctuation” such as parentheses and brackets and braces to show what order to carry out the operations, when that matters. All of the other operations in UD’s (and there are many specialized operations, and you’ll practice a few) are further refinements of our three logical operators.

Too Narrow

Our first expression above was too broad. But our second one? What was the problem there?

$$(Sx \cdot Tx) \vee \neg T$$

This one will go faster. It seems to say “either take Tom and those cities together or forget about Tom (and the California he rode in on).” But our purpose is $x = \text{“Find Tom.”}$ If we can’t find him in S, have we done the job? California is a big place and a lot of it isn’t San Francisco and Los Angeles. We kicked Tom out of our search by being lazy about where we looked. The computer can check every town and city in California if we ask it to (and so can we if we take the time), but we have to enter the data –everyone who lives there. But that data sort of exists (the census, or the tax records, which is about the same thing), even if it isn’t certain to be exhaustive. Maybe we go door-to-door, city by city? But not everyone lives in a city, right? Yet, everyone lives in a county. City is not the right unit to define, is it? So I am going to suggest we have our inquiry check the counties, which can be entered into our UD faster than every city and town, including the counties that include SF and LA. Seems like a lot of work.

Or I can change my inquiry: Find out whether Tom Lives in SF or LA.

If I am willing to take no as an answer, I will have this:

$(Tx \cdot \sim Sx)$

I have gone back to x 's because I changed the inquiry (to counties), and I need to remember that this UD is now altered by my new procedure. It isn't exactly the same UD when I rename it "Counties in California." My UD now has 58 elements, but at least I am sure I will find Tom if he is there. If he is in LA County or SF County, then (and only then) do I know that my city search would have succeeded in finding Tom. So the UD is transformed into one more adequate to the purpose. It is no longer too narrow. The same will hold true for fields and files and functions when you work with a computer. Re-naming is no small matter, and you have to have a UD that matches the purpose.

Well, What Now?

Now, you have learned how to form a UD and have a couple of examples of what you might do with one. The point of this book is not to test you on what you can do with this sort of system, but to teach you to understand what it is and where it comes from, and how it relates to your thinking. Yet, *you* must see it in operation, I believe, to appreciate the process of building such UD's into useful tools for working with machines, and remembering that when you make an assertion for another human being to act on, something analogous (but more complicated) occurs. The assertion must not be too broad or too narrow.

The main advantage of having UD's to reason with is that our logic can be "monotonic." That is a big word, but here is what it means. Once the UD is settled, and the semantic and syntactical requirements have been met, you are rewarded with tight compositionality: every assertion you successfully demonstrate (deductively) as a conclusion included in that UD (that is, any proposition, regardless of how many other propositions make up that assertion), is a *permanent* implication of that UD. This gives rise to "theorems." **A theorem is a proposition that is necessitated by the logical structures of a given UD.**

Once an assertion has been demonstrated, it never needs to be demonstrated again and it can be used in demonstrating other assertions. That means that **every UD generates a unique set of theorems.** The set of theorems you can make from a UD is the finite combination of the elements of that UD that can be formed into propositions that are meaningful within the semantic and syntactical restrictions placed upon them by the characteristics of the relations that make the terms visible in propositions. **The relations of propositions to one another is inclusion in the sense of implication.** Implication means formalized inference. Every element



of the UD is a simple theorem, but these simple theorems can make compound theorems, and that is how we *build* our reasoning. It begins by just saying:

$T \in (\text{UD Find Tom})$

$S \in (\text{UD Find Tom})$

$n \in (\text{UD Find Tom})$

... and so on.

So now your task is to finish what we started with Tom and California. You need a strategy. The best way to form a strategy is to look at the relations and grasp the lines of relation *they* include. In this case we have "north of" and "lives in." This is not easy. Now you have to use everything you have learned. Imagine the relation of these relations. How? (you say)

I suggest the quantifiers, substantive expansion, and Mr. Square. Are *all* the elements things (people, animals, etc.) that live somewhere also north of somewhere else? (A-proposition) Answer: yes, that is pretty much included in the meaning. The relation n makes visible all the elements as terms. San Diego County (the southernmost county in the state) isn't north of anything in California, but it's north of Tijuana. Now, Tijuana isn't in the UD, but it makes " $\text{SD } n \emptyset$ " (the empty set) the true, and also makes the negation: $\neg(\text{SD } n X)$ a theorem of this UD. The contradictory of that theorem should never hold.

But meaning is never wholly determinate, no matter how thoroughly defined. What if California steals Tijuana from Mexico? Wouldn't be the first time something like that happened. Meaning can change. Still, everywhere is north of somewhere on earth, except at the South Pole. So we have a generalization that determines our relation even beyond our UD, and helps with the barn itself (see the next chapter). The exception (the limit case) is the case in which you live on top of the South Pole. Now you know that the only O-proposition that is included in this UD is "Some places (at least one) *are not* north of somewhere else." We enter this as an A-proposition; with that one exception we can use the universal quantifier. We know that the E-proposition cannot be included in our currently considered forms. They are excluded as contrary. But they can be *included as negations*. The I-proposition is included since the A-proposition is the superalternate of the I-proposition.

At this moment, I'll bet you wish you had studied that chapter on Mr. Square more closely. Remember there can be other strategies for determining and piling up propositions, but this one has a great advantage over the others. This strategy will allow you to be pretty sure you have exhausted the UD for everything meaningful. When you compare and contrast all of your relations using all four quantifiers, you have gotten about as close as you can to a complete analysis of the UD. When you



have worked through all the relations, being sure to reverse the order, and you have sorted them into the ones that can only be used negatively, and the ones that can be used universally and those that can be used existentially (particularly), you can use the list to generate propositions that are included, such as our example:

$$(Sx \cdot Tx)$$

This is a compound theorem of x (where $x = \text{Find Tom}$). We added earlier " $\forall (T \notin x)$ " and that was syntactically problematic. But this is not a problem now:

$$(Sx \cdot Tx) \vee \neg T$$

We now can interpret this as, in finding Tom (the name and purpose of the UD) "Either treat Tom's residence and SF n LA together (with the UD of other counties in California), or exclude Tom." He doesn't live in California, in the case in which the conjunction of all the counties, with all being north of some other, except the limit case SD, fails to produce Tom. We can treat this as a theorem. We can also find symbols for expressing that when Tom is living in SF, he will be north of LA, and when he is living in LA he is not north of SF. Can you devise good symbols (syntactically unambiguous and semantically meaningful) for these relations?

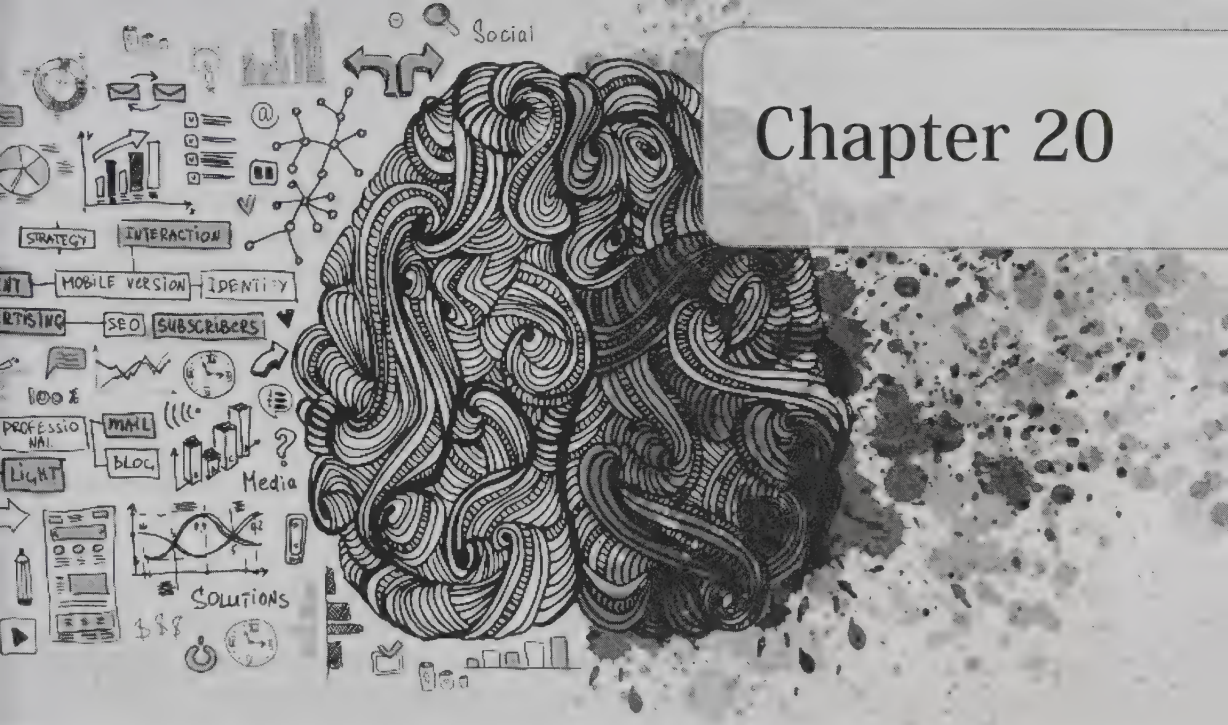
A final note. You will see that this process of reasoning supposes and also clarifies a certain sense of the preposition "in." In this case, the intuitive sense of "lives in." That sense of "in" is the central relation of an analogy, and if you fail to make that meaning clear when you assert your conclusion, your audience may not follow you. If you simply say "Tom is in California," for all I know, he's visiting. It's a different central relation, and thus, a different analogy that pairs with the world in a different way. All of your effort at reasoning can be in vain if you do not attend to the validity of your assertion, and that is an analogical function, inductive in application. It is not a part of your reasoning strictly within your UD.



EXERCISES:

1. Taking the UD we have devised, list a complete and exhaustive set of *logical* relations among your terms using the Square of Opposition. You need not list all the counties in California. You may generalize. It's up to you as to how. Make up a strategy. Be sure it isn't too broad or too narrow.
2. Using the results of number one, provide six compound theorems that are included in the UD. (Any six will do, but they must be compound –not just the assertion of elements.)
3. Now, create *your own* UD of three elements, two terms and two relations that make them visible. Provide an analysis, a good one, using quantification, substantive expansion, and Mr. Square. This will take some effort.
4. Provide six compound theorems that are included in your UD.

(You may want to form groups to do this homework assignment. If you slow down, and eat the whale one bite at a time, then you *can* do this.) Now you are ready to learn a computer language –or maybe now you understand the computer language in which you were already fluent. Maybe you are even ready to create your own programming language.



Chapter 20

CLASSES

Leave the Barn Door Open

I said in the last chapter: “We have discovered that symbolizing our thinking runs the risk of excluding what we *needed* to include” We have to revisit inclusion and exclusion (both intensive and extensive) in considering classes. These are the untrained horses in the barn, functioning as vague conceptions we *might* draw upon in ordinary conversation. Questions about classes have two sides: one is the small door to the corral, the UD, for formal reasoning; the other is the big barn door that opens onto Rancho Logos. You don’t reason formally every day, but every day you deal with several barns at a minimum. Somewhere in the great distance, there are gates that open onto the prairies and forests and mountains of the world beyond Rancho Logos, which is the full domain of human culture. And beyond that, nature, which is a topic for another book.



In the last chapter we learned about the formal *operations* that can be carried out in Universes of Discourse (UDs). We mostly left aside the discussion of the relationship between classes and UD, but now it is time to take up the questions raised by this process of moving (really it is *transforming*) a conception into a concept. **Operations occur only within the UD; relations between the UD and the class are called “functions.”** Functions are like ways of leading the horses *from* the barn *to* the corral. We call that door the “functional” door. It only opens onto the corral *from* the barn. You can summon a horse, you can lure it with food or a potential mate, you can put a rope on it and urge, you can hoist it with a crane and lever it over, you can put it on a conveyor belt, and so on.

The important point is that there is a movement of “*from . . . to*.” A wonderful logician from Finland named Jaako Hintikka (1929-2015) decided to define “epistemic logic,” as it is now called as a logic exhibiting a “*from . . . to*” structure. It is how inquiry works when the aim is to produce knowledge, especially scientific knowledge. One can inquire for other purposes than to have knowledge, or for kinds of knowledge than scientific knowledge. But where the movement of “*from . . . to*” is discernable, this is probably inquiry of the sort we examine in logic, since it can be better or worse in its results, and the norms associated with carrying out our abductions, deductions, and inductions can succeed or fail, relative to our purposes. Hintikka always credited this insight about inquiry to the British philosopher R.G. Collingwood (1889-1943), but in fact, a number of other philosophers had emphasized it earlier—I have mentioned them earlier in this book, namely, Peirce, Royce, James, and Dewey, who were all called “pragmatists.”

You can feel the movement of “*from . . . to*” when you think about moving class members toward being UD elements. There are lots of ways to get a horse into a UD, that is, to form a conception into a concept. Some are more natural, some more technical. Most logic books take the technical approach. This book prefers luring the horses with what they already desire, which is to serve a purpose. Forming concepts is something you do every day, and you do it when you need (for whatever reason) to clarify what you are *already* thinking about in light of some purpose you want to work toward. We call the whole process “inquiry,” here, following John Dewey. We prefer *luring* horses to the UD. There is a word for this luring: heteroglossia, which assures the primacy of context over text. Heteroglossia is “the base condition governing the operation of meaning in any utterance.” (Wikipedia) I would say that as an *operation*, heteroglossia is a derivative of a class-function, the transformation of a conception into a concept.

Luring a Steed

We are aware from far back in the book that in carrying out the function of concept formation, we sought the “essential core” of a conception, that group of



associations without which the concept would not be the concept we *call it*, in order to be fully determined as the well-defined concept it is and must be. These *associations* we now call “constituents.” We need this term so that we can discuss the relation between class members and elements of a UD. But we can’t do any of this functioning without some purpose, some “end-in-view,” as Dewey called it.

We saw the example of a wedding, as involving at least two people, a witness, and some vows. Our purpose in that case was to illustrate (generically) the process of concept formation. We did not really need to understand what a wedding is, in particular, but we might have needed to know that if we were planning one. We also saw that a cake recipe has a whole range of common associations (“constituents”) and that one could remove any one or two of these constituents, but not much more than that, and still have a cake. We didn’t actually intend to make a cake, but we might need to do that, at some point. Two bakers sitting around discussing whether an idea for a new cake recipe will “work” (will make a good cake) is an example of such an inquiry. So, you have some examples of “function,” of getting from the barn to the corral, from the class to the UD.

We called the horses in the barn “class members” and the ones in the corral “elements.” And we asked whether they are the “same.” The answer was “yes and no.” The horses in the corral and the elements of the UD, have a kind of “identity,” which we have said is Aristotle’s fifth sense of “is.” Whenever we want to say that an element or group of elements is “the same,” our propositional form is: $S \text{ is}_5 P$, we use the universal affirmative form: $\text{All } S \text{ is}_5 P$. It works just as well for proper names, groups of elements, or propositions in which the predicate is wholly, determinately, intensively included in the subject (for the trained philosophers reading this, the proposition may be synthetic or analytic; it doesn’t matter). This kind of identity is a characteristic *only* of some elements in some UDs.

The Thing Meets the Blob

But there is a sense of “is” we have hardly mentioned in this book until now: is_1 . Aristotle calls it “ousia,” which is translated as “substance,” but it has (at least) two different meanings. There is secondary substance, which means “universals,” and that is what we have called “wholly determinate concepts” in this book. The kind of substance this relation has is identity, is_5 , between UD elements and class members (and sometimes among elements themselves). The primary sense of “substance” is not the universal, but real individuals, composites of form, matter, and purpose. *These* real individuals serve as class members. To get in through the big door into the barn (so that something meaningful can be said about them), the horses (ideas) must have form, matter, and purpose (not a determinate goal, but the sort of beast that can be *used* to achieve determinate goals). The barn itself is more than a context, but it is at least that.



If you have an intuition, a vague idea, some sort of blob, and you want to think about it, you have to form an image. It need not be visual, it can be an image of a sound, a smell, even a physical feeling. You might imagine a song you are not hearing right now, and that act of imagining makes the sound of the song “an image.” You can imagine how cookies taste when not eating them. That also is an image. The image we think of is *not* the thing imagined. It is a substitute for that thing. *The thing* is a real individual, the image is what we substitute for the thing. The thing is what it is regardless of our conception of it, but its main function is to give us ideas. Those ideas are blobs. We have a bunch of names for such blobs—intuitions, notions, gleanings, hunches, and it’s a sort of a feeling that is *trying* to become a thought. So it has a purpose already: to become a thought.

You might name the image, you might not. This book has already shown you how to do that. “Naming the beast” is a function, not an operation. It is an act of self-interpretation, and it always seems inadequate, but it helps to create the context within the barn for luring horses to the corral. But naming the image “intensifies” and “articulates” it, as well as provides a handy-dandy handle for holding it in your mind, and calling it up again when you are not thinking about it.

This whole process is called “symbolization.” You do it all day every day, and even at night when you’re dreaming. **Every time you create symbols to represent something, you go through this process of creating a context from a broad space of potential meaning, and then making an image of it.** The image of that blob-of-an-idea *is* in fact the primary type of symbol. All names are symbols, but not all symbols are names. A name is a sort of a symbol *of* a symbol. The image itself is the primal symbol, intensifying and articulating the blob-of-an-idea, such as intuitions, and other vague feelings at the edges of our experience. And the process is a substitute for the whole situation of that barn, which is **an artificially or artifactually (always culturally) enclosed structure made to stand on a horizon on possible meanings within the “world,”** which is the name for the place where Rancho Logos is found. The world is in “the universe,” and that’s a big question, but we need at least “the world” in order to think about the universe.

So a context is a way of looking at the barn and what’s in it. Look at it a different way, you see different things, different uses and potentials for the horses you see there. All the horses have at least primary substance to work with. They are individuals (both form and matter), and they can be formed around goals. That is what a class member is. But what can you do with it? You will be surprised. There is an entire range of actions, including a mathematics of potentiality that describes what we can do at the threshold of the big barn door (where real individuals become images for us, with potency for our thinking). In fact, that is where mathematics exists as an exercise: at the threshold between potentiality and possibility, the big barn door. We will learn one system in the next chapter.



The Corral Door

For now, let us concentrate on the relation between the UD and the class, from *within* the barn. We have seen some of what can be done with the operations of the UD. We learned that once you have carried out a successful operation in the UD, you don't have to do it again. It becomes a theorem of the UD. This means that all UD's are "monotonic," which is just the fancy word for all that. They are also monotonous, because you never learn anything really new when you're outside in the corral. You can only get out of the horse what it already was willing to do when it came outside. These are very repetitive applications of "and," "or," and "not" in formal arguments that either completely (deductively) "intensively include" their conclusions, or fail to.

But what about the relation between the members and the elements? Don't the *members* "intensively include" the *elements*? Yes and no. That is the question of identity, but when asked in this way, it is no longer is_5 . It is a broader question than formal identity (is_5). From inside the barn, it is about substance, whether the horse in the corral, broken and trained, is the *same* horse that was in the barn. From inside the barn it is hard to decide about this. Back in chapter 8, in the first discussion of intensive inclusion, I said:

These [prior] examples could all be expanded using "thing." "The thing that is a man is a thing that is running a fever and the thing that is a fever is a thing that is a symptom." In each of these examples, the first term is included in the second in some way. But can we be more parsimonious? Surely we can. "Thing" includes far more stuff than we need to be thinking about here. Consider it. What expansion term will capture the relationship between these two references? If you diagram the two propositions separately, marking denotation and connotation for each (and obviously it's the eighth meaning of "is" in both, condition), and name the references, and then consider what the references have that binds them in a larger class, well, you'll surely see something. How about: "The unhealthy man is running an unhealthy fever, and the unhealthy fever is an unhealthy symptom." The expansion is an adjective, grammatically, but it defines a *class* of things to which all the terms belong. That's our goal.

"Thing" is the word we use to *indicate* that a constituent of a proposition from a UD came from the barn. The term "indicate" is chosen on purpose. It is a "pointing," as with our *index* fingers, and that is how we create an "index" for any purpose. We index the elements to the members, but there is a difference. Formal identity in the sense of is_5 is weak (all that work getting things from the barn to the corral takes its toll on the horses; they are "the same" only in a pale way). Formal identity just points. But substantial identity in the sense of is_1 asserts the existence of the "thing" as a thing—it is an idea, sure, but it is more than that; it is individuated and



purposive. It's in the barn, but it came from the Ranch, and even from the prairie beyond the Ranch.

Substance and Identity

We are now in a position to understand those substantive expansions we learned earlier in more detail. When you were seeking parsimonious expansions, you actually wanted to name a class. That is, you wanted a determinate point of view on what's in the barn. You wanted to create a context. You needed an image, however vague, and to use that image as a symbol of your purposes: the thing, yes, but more parsimonious –a “take” on the thing.

When you expanded your formal propositions by inserting a more general word that included your term, you “classified” it: you indexed it to a class in the barn. I suggested back in chapter 8 that the sense of “is” (2 through 10) would be a good guide to classification. That was true because the idea of “class” comes as close to the meaning of “substance” (is_1) as we need to get in our logic class. Aristotle suggested that “substance” (is_1) *includes* all the other senses of is. To be honest, I don't care if Aristotle is right about this. People do argue about it. For our purposes, it is close enough. We are stopping at the mathematics of the big barn door, ok? We will look at the wider world in another book.

I will say only this: “substance” is the place we depart from, in our thinking, and “being” (all ten senses of “is” in their plurality) is the place we arrive when we have *made* a predication. This is a paraphrase of something said by my hero C.S. Peirce. When you make a predication, you move from “substance to being.” Peirce thought of it as *rising* toward clarity and meaning. You do it every time you say something. Where does that sentence you say come from? The prairie, the Ranch, the barn, and maybe also the corral, if you are being very precise).

The result of our creative activity in the barn is that we made it sensible and meaningful to say S is P . **Predicating is a creative act, an act of creation.** This dictum also comes from Peirce, that substance rises to being *in* predication. He is smarter than you and me, and equally as smart as Aristotle (which is saying something), and we can trust them for now and argue with them later. Aristotle called this act of creation “poiesis,” from which we get our word “poetry,” but he means something much grander. In making up words and sentences, *you* are a creator.



You and The Thing

I also said this in chapter 8:

But trying to produce this “best” general term of “inclusion” directly from your imagination or intuition or a hunch? Without doing the slow work? That’s pretty hard. You’re only guessing when you do that. I’m trying to make it easier. Do the work. You’ll see. This skill is more valuable than you realize. It will put you in charge of every discussion if you can do this because you will have the exact word that binds everyone’s constructive thinking together.

So, don’t shout assertions out of the barn door. You need to train them ponies. Lure some horses out into the corral and only shout what they’re doing when you are ready to show them. Remember, the corral opens back out onto the whole ranch, beyond its fence, and communicates with the whole world as surely as the barn door does. But the assertions from the corral aren’t guesses, they are more like science (in the broadest sense of the word, that is, tested and reliable). The guessing is best done *in a barn*, or at the big barn door. Peirce calls it abduction. We learned about it earlier.

The reason that finding the class name has such power is because it reaches beyond the immediate confines of the UD and into the generalized context of creative interpretation, and introduces a limit and a binder on people’s understanding and judgment of the context. They don’t see that context directly, they infer it; they know it’s in the barn, but they can’t see how you formed it. You have to help them guess better by making your analogies tight –that is, valid.

Way back when, I also said this: “When I say that ‘all the cookies are burnt,’ you have every reason to expect that, upon inspection of whichever collection of cookies was **designated from the class enumerated by ‘the,’** there will not be a single cookie unburnt.” We saw that quantification is enumeration of the UD. But *enumerability* belongs to the class. In the barn, things are individual enough to be enumerated, but they are *not yet* enumerated. Quantification by enumeration, even though it occurs in the UD, also *draws on* the structure of class, and of class name. Enumerability is the *signate quantitate* (everything sounds fancier and more important in Latin), not actual counting, but countability. You cannot let a quasi-horse into the barn. But just because something is *countable* does not mean it is fully determinate. When it moves to the corral, you have actually to count it. Indexing, then, is the memory of having actually counted something that was already countable. It depends on the past, has a history. Just think of yourself pointing at horses in the barn and counting, and then remembering everything you counted.



I also said this: “. . . when you successfully think about the denotation and the assertion together, you can [think backward and] *see* the class defined by the subject term and at the same time see that within that *class*, at least one element ([one] cookie) is *not* part of the connotative class, and maybe not a single element is [(it's a mess, a quasi-cookie that didn't quite make it)], but certainly at least one *is not* and maybe more” (emphasis added now, and also the clarifications we have learned since I first said it). I was explaining the division of the subject class from the predicate in an O-proposition. But that act of “seeing” the class as “in” the elements, as denotation or connotation, is the general act of seeing “ is_5 ” in “ is_1 ” —all identity depends on substance, but does not exhaust substance. In other words, everything you talk about, or even think, about is a thing, even if what you're thinking about is not the whole of the thing, but is only indexed to it, counted as one of its functions.

You had no idea you were doing all of this by thinking and formulating it as declarative sentences, but you were. It's just about magic. No, I take that back. It *is* magic.

Generic Branding

So, how to work with classes? There are some accepted formalisms, that is, symbol systems, for thinking about classes. Earlier in the book, I reserved the terms “general” and “particular” to describe relations *among* classes. The sorts of propositions we exchange when thinking about classes are called “generic” propositions, not universal or existential. This was John Dewey's idea, but I stole it without shame. “Particular” propositions are the type of generic propositions that have been contextualized: that is, you have formed an image of the class and you are *associating* the parts of that context with the class image (you should name the image so the class will have a name, but as you know, that isn't always easy).

As we said, these class-horses are enumerable but unenumerated. Classes have no proper names, just associated images. Those proper names, being singulars (not particulars), are limited to UD_s. To change a proper name means to revisit the barn. Identity is functional relative to class, and operational relative to UD, as we have said. But what forms of “association” are allowable? Can we formalize these associations at all?

Yes, we can, but the work is very abstract. It is algebraic in form. Remember, algebra is not about numbers, it is about whole groups of numbers that do or don't “satisfy” some “equation.” We now see that the whole idea of “equation,” or of something being “equal” to something else, is a very loose kind of association, instead of an “identity.” Equation is just the strongest form of association. Identity, in both senses (is_1 and is_5) is a function of relations between a class and a UD and/or of operations within a single UD. The difference is whether you branded the horse



(counted it) in some permanent way –it becomes a cherished possession of your reasoning: a good horse, like Black Beauty, Sea Biscuit, Secretariat, Shadowfax, and other “permanent horses.”

Unicorns and You

So there is an algebra of class relations. What does it look like? This process can be formalized in many different ways. One can begin with a set of axioms and tease out their associated relations (this is not always just geometry; geometry is one of many axiomatic systems). One can begin with a formula and see what it “captures.” The basic idea of an algebra is to toss out some kind of form and see what constellations of things satisfy the variables. I am calling these “constellations” instead of “sets” because just like constellations of stars, they only form patterns if you stand in the right place. You stand on earth and see “Orion” but there is no such constellation visible if you stand on a planet circling a star in Orion’s belt.

It is the same for the associations we constellate in the barn. These “sets” of “constants” or even sets of variables are *open*, enumerable but unenumerated. Their association is *made* by the image we create of them. That is what a constellation is, a loose, imaginative association from some particular point of view. Therefore, we call this activity of creating an image “particularizing” to create a context. This is not only how algebra is done, it is how fictional characters are created: constellated character traits and physical features that no real individual ever possessed. We encountered unicorns before, and “the present King of France.” They live in the barn. They are “particulars.” You already know a good bit about their context, so you have no trouble imagining them.

A novel is created by a kind of algebra, very complex. To do that well is much harder than any kind of mathematics. But bringing a novel into actual publication does not assert its propositions to be “true of the world,” only to be true to the idea of the novel, the perspective or perspectives from which it is written. We sometimes feel strongly that an author “has it wrong,” that this or that character would not say or do something attributed to it. It is like putting the wrong constant into a well-defined formula to satisfy an equation. So there really are constants and variables in the logic of classes, and their modes of association can be vague, but must *at least be* constellational, or what psychologists call a “Gestalt,” in order for us to *associate* them.



Brass Tacks (Again)

Let us look at one such algebra (there are many, and you can use them to generate anything you like). I said earlier that some people treat the hook " \supset " that means "if S then P" as being *identical* with the disjunction (" \vee ") "either S or not P." I also said that is an error, and so it is. The disjunction operates for us clearly *only* within a UD, at least within the system I am teaching you. It is a strictly deductive relationship. But the hook has a much broader meaning, addressing possibility, not just actual UD's. And that hook is a very powerful form of association that we can use in describing and working with associations of class members. That is why we use the hook to indicate the two kinds of intensive inclusion, \subseteq ("is intensively included in") and \supseteq ("intensively includes"). We also have the negative forms of these symbols, $\not\subseteq$ and $\not\supseteq$ ("is not intensively included in" and "does not intensively include"). This is the terminology when we speak of classes from wholly *within* the barn.

Here is a rule:

Where x is an element of some UD ($x \in \text{UD}$), and some class C includes that UD ($C \supseteq \text{UD}$), therefore ($x \subseteq C$) and reciprocally, $C \supseteq \text{UD}$.

This is called the **Conservation of Intensive Inclusion**. This is sometimes called "binding" in other systems of logic. Here it is just a little different because logical binding that limits "scope" covers only *extensive* inclusion. (That is all that other books seek to teach you.) Our rule is much richer. But it includes the idea that the elements of the UD are "bound" to the class from which they were taken. One problem with the idea of "scope" is that it does not always conserve meaning. You can go read about that in some other book.

Wherever our rule has been followed, one may use both existential and universal quantifiers in reasoning about x . One may also reason both deductively and hypothetically about all the elements of the UD. Further, x may stand for an individual class member in a class by itself (called a "unit class"), or it may stand for a group of class members. So long as intensive inclusion is conserved, any x , or determinate group (classified) that is called x , may be *moved* from class membership to being treated as an element of a UD. All relations that hold in the reasoning in the UD will be compatible with the associations we find in C (the class named by association in the barn). This is the *formal* way of saying exactly what we learned in the chapter "From Conception to Concept."

This may not seem important until one considers the alternative. Where x is an individual or group of individuals (has been "classified") but *not* (yet) an element in a given UD ($x \notin \text{UD}$), we do not know whether x does or does not belong to C. C is always open. Said in other language, to be excluded from a UD does not



entail exclusion from C. That is very good news, because it means that we may return to the barn to fetch more horses, so long as we are willing to make the new associations, make the members determinate, and to conserve whatever they intensively include as we move them to the UD. In inquiry, you can always recast the problem more inclusively. As with everything, it depends on your purpose. You want a UD that is neither too sparse or too populous.

Therefore, if the UD has more than one element, say x and y , and both conform to the rule of intensive inclusion ($x, y \subseteq C$), we have some extra forms of reasoning, depending on whether the relations we list in our schema permit these while preserving the meaning. These will depend on the relations we choose:

Reflexivity: a relation is reflexive if x is any term, then you may write down ($x=x$)

Symmetry: a relation is symmetrical if x, y are any terms and ($x=y$) preserves meaning, then you may write down ($y=x$)

Transitivity: a relation is transitive if x, y, z are any terms ($x, y, z \in UD$) and both ($x=y$) and ($y=z$) have been written down, and are in scope (bound to the class), then you may write down ($x=z$)

Where ($x, y, z \in UD$), under conservation of intensive inclusion, and where they are reflexive, symmetrical, and transitive, you may also reason as follows:

1. $x \supset (x \vee y)$ **Addition** (You can disjoin any element to one you have already specified.)
2. $(x, y) \supset (x \wedge y)$ **Conjunction** (You can conjoin any two elements you have specified.)
3. $(x, y \dots) \supset (x)$ **Simplification** (You can think individually about just one element from among those you have specified.)
4. $(x, y) \supset \{[(x \rightarrow y) \wedge x] \rightarrow y\}$ **Modus Ponens** (You can specify any two elements and treat one as a sufficient condition for the other.)
5. $(x, y) \supset \{[(x \rightarrow y) \wedge \sim y] \rightarrow \sim x\}$ **Modus Tollens** (You can specify any two elements and treat one as a necessary condition for the other.)
6. $(x, y) \supset \{[(x \vee y) \wedge \sim x] \rightarrow y\}$ and $\{[(x \vee y) \wedge \sim y] \rightarrow x\}$ **Disjunctive Syllogism** (You can disjoin two specified elements, and in the unavailability of one conclude the availability of the other.)
7. $(x, y, z) \supset \{[(x \rightarrow y) \wedge (y \rightarrow z)] \rightarrow (x \rightarrow z)\}$ **Hypothetical Syllogism** (If you make one specified element a sufficient condition for a second, and then make the second a sufficient condition for a third, the first is a sufficient condition for the third.)
8. $(x, y) \supset \{[x \rightarrow y] \rightarrow [x \rightarrow (x \wedge y)]\}$ **Stuffing** (If you make one specified element a necessary condition for a second, you stuff the first one into the second.)



Perhaps you recognize these. They were offered as acceptable forms for arguments earlier in the book, but now they are fully formalized and defined. Really, they are mostly common sense, but common sense needs formalization sometimes. The “ \wedge ” symbol is new to you. It means the conjunction of elements that do not *have to be* conjoined. Unlike the horses always found together, “conditional availability” (see below), this is a “free conjoining,” a trial grouping of independent elements.

You have not seen the arrow “ \rightarrow ” before. It means “is a condition for” or “is conditioned by.” Taken together these mean “conditional availability” *in one’s thinking*. There are two very different ways to think about it: whatever is *necessary* for something else, or what is *sufficient* for the availability of something else. The second idea is “stronger” than the first. When you speak of the metonymy of cause and effect, you mean “sufficiency.” The same for any other horses that have so strong a bond that wherever the first is, the second will definitely be there. On the other hand, when you are trying to figure out the core elements of a concept, you are asking what is necessary to it. But when you decide one is *always* the sign of the other, you are deciding to think about them as permanently linked. That is the “strong” linking, so we say it is “sufficient.”

Thus, looking at the difference between the hook and the arrow, your reasoning is *hypothetical* in general (the hook) and *conditional* in application to the UD. You can add to list of the eight rules above: “constructive dilemma” and “destructive dilemma” that we discussed earlier in the book, if you like. You rarely think that way, but sometimes (especially in figuring out which teams go to the play-offs). These are just forms of thinking about UD’s that you can feel free to repeat. They are not creative at all. They only show you what you’ve already done, already assumed, in making your concepts fully determinate, but there is genuine complexity in our concepts, so it is a good idea to practice with these forms (and just these) for reasoning.

These forms are also extremely useful because they serve as **semantic rules for UD’s**, and they work well when trying to communicate with computers, in language that is semi-codified (such as COBOL or BASIC). Many logic books spend almost all of your time investigating the minutiae of these relations. It isn’t really important enough to waste your effort with that, because all these rules really tell you is what you already *did* when you moved something from a class to a UD. The real action was in *making* class members into UD elements, conceptions into concepts.

But we did gain something more. There is a second set of rules we *now* have in our toolbox, due to our effort at relating classes to UD’s, and these are even more useful in some ways. These are **syntactical** rules, ways of substituting forms of relation for one another. They also require that we assume reflexivity, symmetry, and transitivity, for all the specified elements. These are also different ways of *saying* the same thing, and that sometimes helps your reasoning. By drawing on

syntax to conserve meaning, we learn to say “the same thing” in different words. Unlike the other ones above, all of these rules are *commutative* (it does not matter which part is on which side of the “=” sign).

1. $(x, y) \supset [(x \rightarrow y) = (\sim y \rightarrow \sim x)]$ **Transposition**. (Where a necessary condition is unavailable, you can transpose the terms to express the unavailability of the other with no loss of meaning).
2. $(x, y, z) \supset [(x \rightarrow y) \wedge (y \rightarrow z)] = [(x \wedge y) \rightarrow z]$ **Exportation** (When two elements are each necessary for a third, you can conjoin them with no loss of meaning.)
3. $(x, y) \supset [(x \rightarrow y) = [\sim x \wedge (y \vee \sim y)]]$ **Particular Insufficiency** (When one specified element is a sufficient condition for a second, the unavailability of that first element does not mean the second is unavailable).
4. $[(\sim x \wedge \sim y) = \sim(x \vee y)]$ and $[\sim(x \wedge y) = (\sim x \vee \sim y)]$ **De Morgan’s Theorem** (The individual unavailability of any pair of conjoined elements is the same as their collective disjoined unavailability; and the collective unavailability of any pair of conjoined elements is the same as the disjunction of their individual unavailability.)
5. $[x \wedge (y \vee z)] = [(x \wedge y) \vee (x \wedge z)]$ and $[x \vee (y \wedge z)] = [(x \vee y) \wedge (x \vee z)]$ **Distribution** (The conjoining of one element to a disjoined pairing of two other elements is the same as conjoining that first element to each of the other two in a compound disjunction; and the disjoining of one element to a conjoined pairing of two other elements is the same as disjoining that first element to each of the other two in a compound conjunction.)

This, brothers and sisters, is *not* just common sense. This is the prize pie at the county fair of reasoning. You get good at *this* kind of thinking, people will pay you for it. They pay *me* for it. But that’s why I am here for you. I want you to survey the wonder of these syntactical rules and to internalize this fact: you learn this, you can learn any computer language. The combination of the semantical rules and these syntactical rules is the basis of computer programming.

Unfortunately, the system is not perfectly balanced. The relationship of intensive inclusion as you tread the path from the class to the UD is a form of disciplining your power to conserve meaning through some pretty heavy transformations. The heaviest one is De Morgan’s theorems, above, that enable you to substitute semantic logical operations (and, or, and not) for syntactical forms that are irrelevant to your terms. I used the language of availability and unavailability to describe it, but trust me, it’s heavy stuff. You don’t have to understand it fully (no one does), but you can *do* it. It works. It’s like magic. But it’s no mere magician’s trick. It’s more like alchemy, a real transformation that works but seems arcane. Here is a picture of Augustus DeMorgan.



You tell me *that* dude doesn't have something up his sleeve?

The distribution rule is also a pretty good piece of magic, since it lets you substitute the logical operator “and” for “or” and “or” for “and” by rearranging your groupings. It's like trading players in Major League Baseball, or quarterbacks in NFL Football –an even better metaphor, since we all know there are 32 teams but only about 20 quarterbacks with the skills to win. So, everybody is scrambling for one of those 20. There is an economy of formal syntax to football. 20 to 32 in a normal year. So, no substitution is *guaranteed* to pay off, but you can do it: you can assume Carson Wentz won't be injured this year (for once) and trade Nick Foles. You might decide not to re-sign Tom Brady and get Cam Newton instead. But you may lose. The formal trade works (the syntax) but don't wager on true substitution, even where meaning is conserved. Things would change greatly if there were 70 quarterbacks with those skills.

As I write this, Tom Brady, probably the greatest quarterback of all time, went from the Patriots to the Buccaneers (at over 40 years old). He has changed teams but he's still an important factor in the NFL. That is how to think about distribution. We can regroup all the players in the NFL according to the rule of distribution, so long as we know exactly who is in and who is out. Fantasy Football is an exercise in syntactical distribution. If you're getting your ass kicked in some kind of fantasy league, keep studying and working with these rules and you'll get better. Master De Morgan's theorem and you'll be unbeatable.

If you are super sharp, you will be wondering “what happened to the relations that make elements visible as terms?” Well, remember, *terms* are ways of hooking up “constants,” and all I have been doing with you is showing you formulas, ways that constants *might be* hooked together. When I start talking about Brady and Foles and Wentz, we have *actual* constants. They just exemplify the possible substitutions.



The meaning of "is" in all formulas is (at bottom) " is_1 " because it includes all the other senses of "is," intensively. But if you are going to do some actual inquiry, you'll be sure to consider what senses of "is" you are working with when you train your horses. So the "=" means " is_1 " plus whatever further elucidation you want to add, so that it's, say, mainly " is_9 " or " is_3 " or whatever. When you move too much without generalizing first, you will be reasoning ambiguously.

Will this help you at the black-jack table in Vegas? No. You have to be in control of all the events and their meaning in order to use this system. You put a bet out, it's like an assertion and it might fail. Being the best logician in the world will not give you complete control over the meaning of real events. It gives you a better chance of making yourself clear, and we assume clarity is closely related to understanding. But the world just may not care what you mean or what you want to happen. Chance is not controlled by logic, and neither is ill-will. Go study persuasion for the latter. There is no controlling for the former, although there is a logic of possibility that, if it is ever understood, might help with overcoming bad luck.

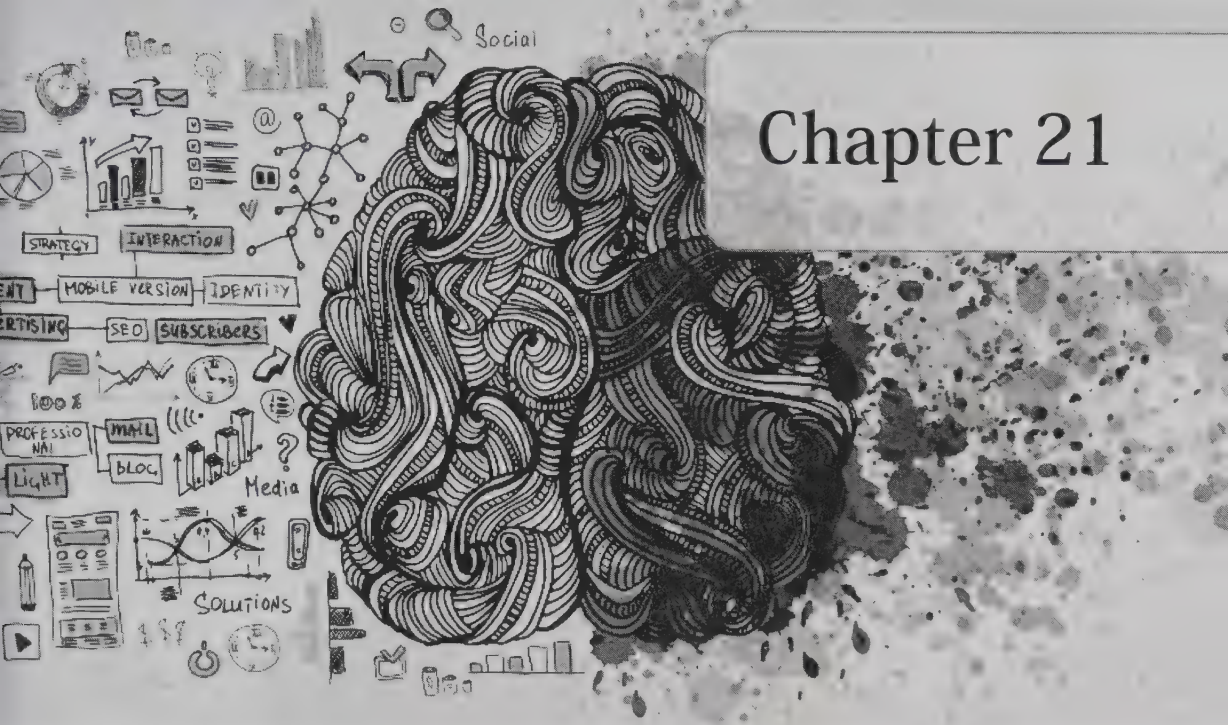
To do anything creative with computer programming requires, however, more than these rules and principles. You have to spend time in the barn with one eye on the door to the corral and one eye on the big door to Rancho Logos, and World it belongs to. That's our next chapter.



EXERCISES:

This is an exercise, and you are going to do everything backwards from the way it really occurs in the world. But once you have done it backwards, then you'll see how to do it in the real order.

1. Imagine a corral. It has four horses. Name them.
2. Create a list of class members, in the barn, that can bear those names. That list will be a schema drawn from the names you chose. (You have created such schemas in earlier exercises; use capital letters as symbols for the names).
3. Name two relations that help to organize the horses in your corral, and then decide on a purpose for your inquiry. Or, you can do that in the reverse order. Decide on a purpose and then choose two relations. (Lower case letters for these, please.)
4. Specify two terms (horses) from the UD and conjoin them.
5. Make the conjoined pair a sufficient condition for the presence of a third UD horse. (Just write out the symbols.)
6. Transpose the resulting formula.
7. Make one of the specified elements a necessary condition for a second. (Just write out the symbols.)
8. Export the formula that results from #7.
9. Conjoin a pair of elements, and then assume both are unavailable.
10. Express their unavailability using a syntactical equivalent, following De Morgan's theorem.
11. Conjoin one of your horses to a disjunction of two others.
12. Distribute the outcome of #11.
13. Don't kill me or your teacher. We are trying to help you.



Chapter 21

CONSTELLATIONS AND CLUSTERS

Inside the Barn

We must discuss what you can do with class members while inside the barn. There are many ways of constellating the ideas into candidates for classification (class membership). “Constellating” is what you are doing when you are associating the candidates for transformation-into-concepts that *can be* lured into your UD, your corral. But you aren’t luring them just yet. The activity of constellating is hypothetical, which means you don’t actually have to make these candidates into concepts in order to carry out this kind of classification.

The patterns of association I will describe can also be used in a UD, but in that case we are working with *concepts*, determinate enough to be used either as subject or predicate in a proposition. While working hypothetically within the barn, all of these candidates for

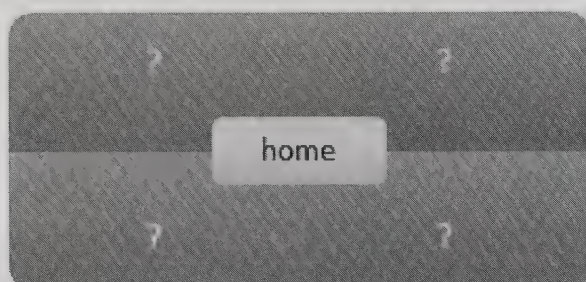


conceptual transformation are just predicates, connotative fields that might or might not need to be intensified by determinate inclusion and “leaving aside” of unneeded connotations. The whole activity is carried out in a “context,” which is a purpose *plus* some ideas and a barn (more about the barn later).

Forms of Association

Back when I was teaching you about analogies, I said this:

Now you are ready to consider something really tough. You now have to build your corral and then decide what horses to bring to it for training.



There. It is time for you to think about “home,” but not as a subject or a predicate. You must see it as a relation, one that binds four concepts to one another, as comparison and contrast, all in one complex unity. The outcome of this will be not just a concept, but a real *idea*. You will be in a position to write a very nice essay on the *idea* of home, when you have chosen the horses [terms] and placed them on this schema.

You formed an *idea* by considering a complex unity of conceptions, treating all four terms of an analogy not as denotative terms in a proposition, but as connotative functions, *predicate* terms “made visible” by relations. Having named a relation, “home” in this case, and seeking unity under contrast (non-identity), you were witness to the movement of a living idea, an idea fresh in off the ranch and wandering into the barn. That horse still has sweat and foam all over it, needs to be watered and fed, and then maybe bathed and brushed, before we can even think of luring that beast toward a corral.

I said that the idea in the middle is the “CR,” the central relation of the analogy, and I said it was the relation of relations, bringing together (as it does) over twenty other clearly definable relations in one non-linear complex feeling. You can’t quite think it all at once, reflectively, but you can *feel* it as an act of *understanding*. The Germans call this “Verstehen,” and it is a rich word. They built a whole “science” out of it called “hermeneutics.” The art of ideas is an art of understanding that supports the process of concept-formation. That is what you were doing in the last

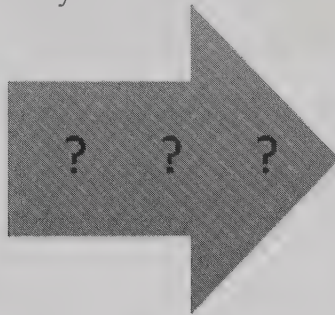
chapter, seeing how concept-formation can be described formally.

The Family of Linear Patterns of Association

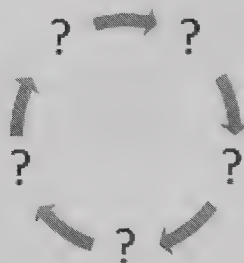
This act of “understanding” actually comes in only a few forms. These are the patterns of association we most often use when classifying. Consider this:



You know this sort of exercise, but here we have a pattern of association. It is linear thinking, lining up the horses in series. In this case you can see that it gives you a feeling of motion. So, looking at the class members, you can make them a sequence (in time, perhaps, or according to any other linear form of order you choose: numerical, priority of importance, and so on). Here is the form. Use it freely and often to associate your class members.



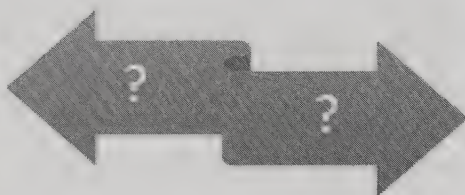
You can point the arrow up or down (linear hierarchy, like a chain of command, or any other top-down or bottom-up way of classifying). You can make it move left-to-right or right-to-left. It's still linear association. But of course, there are other forms of association. There is this one:





It is really the same as the first one, except that at some point, it closes upon itself. This one is really nice for some purposes, like describing the cycles of anything that occurs *in* a cycle, such as ecosystems, and life, and internal combustion engines (minus fuel and exhaust, which are linear), and so on. There is always a way out of the circle and also there is stuff that the circle doesn't explain or even include, but without this handy-dandy little pattern of association, we'd have a difficult time knowing whether to describe an electrical circuit as complete or incomplete, or a system as open or closed. This will be important later.

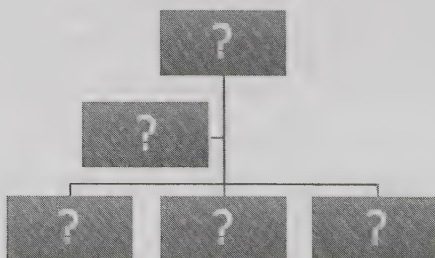
Then there is this:



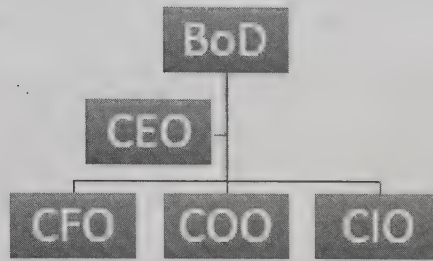
You might call this “bi-linear,” since it is like linear classification, but the sense of motion is away from the implicit center. It's best to think of this as *contrast*, although it is really contrast under unity, since there has to be an implicit idea in the center, some common ground or space of shared meaning that permits the subsequent contrast.

The Family of Comparative Patterns of Association

Comparative patterns of classification are more complex than linear forms. The contrast above has an implicit comparison of shared meaning, but since it remains implicit, and since the purpose of the pattern is to draw our attention to differences, I place it in the family of linear associations. Here is our first comparative form:

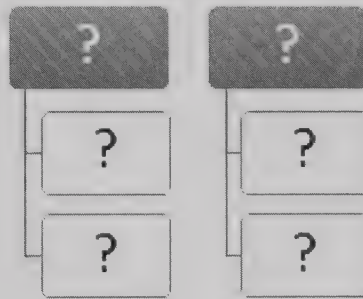


As you can see, this is a hierarchy, but it isn't linear. It involves mainly comparison, but there is some implicit contrast. Consider this way of filling it in:



You probably know what these positions are and how they work. A chief executive officer runs the company for a board of directors, and has chiefs of finance, operations, and information. To think a hierarchy like this, you have to associate in several ways at once, including linearity, contrast, and comparison. You can feel that it introduces some vagueness into your classification, as you try, simultaneously, to think that the subordinate chiefs “answer to” the CEO but “work for” the BoD (especially if the CEO begins to give directives that are out of keeping with the policies, plans, and decisions of the BoD). One really must have non-linear hierarchies to achieve balance in complex matters.

From here we consider a second non-linear way of handling associations:

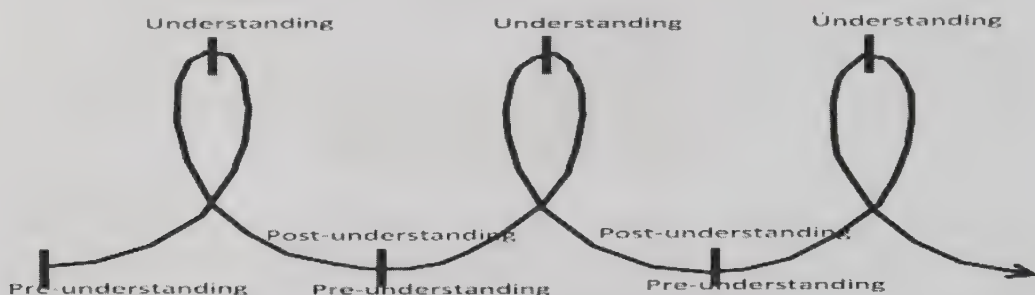


You might call this “bi-linear comparison,” but I think it is better to call it “strict comparison.” You did this in the exercises on logical operators, where you were trying to sort out whether to go with your four friends on a road trip or stay for a house party, and also when Penny and Howard were trying to build a case for going to the movies or the bar on a Tuesday night. The starker the exclusion is between the two hierarchies, the greater is the contrast we have to hold in our thinking, but individual class members can appear on both sides (as we learned when we did the exercises on conjunction, disjunction and negation).

Finally there is analogy, where we began this discussion. It combines all the patterns of association into one huge pattern, with many paths of comparison and contrast. You may not immediately see the cycle, but it’s there in the ways that one can move from corner to corner, either with or without going through the center. It is a very sophisticated nonlinear motion of thinking. When used to make progress



in understanding, it is called the “hermeneutic circle,” which is really a spiral. You start with one idea, go outward turning as you go, and come back around, but now at a deeper or higher level of understanding.



There are other ways to associate patterns, such as proximity, contiguity, resemblance, congruence, and others, but most of these can be captured and simplified in one or more of those above.

As to that . . .

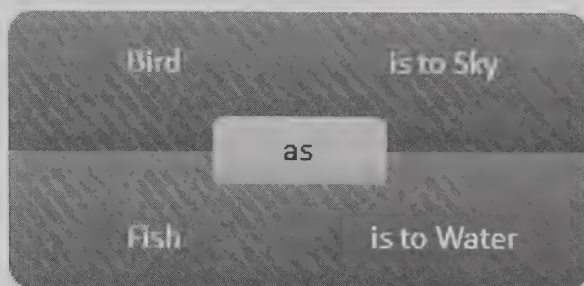
Let's go a little deeper into the analogy pattern of association to see how it can be made to function, that is, how we can make progress with it. There are really just two functions at work in an analogical classification. One of them is pervasive but superficial, the other is intense and deep. You have to have both to use an analogy for any progressive classification of class members.

The first is “is to.” This is different from the “from . . . to” that we learned in the last chapter. The “is to” in an analogy is a very complex idea to analyze, but very simple to think. It makes “is” functional in a way that has a direction, or more precisely, an “intentionality,” an about-ness, an *intent*. Intent is slippery and highly transient, changing like a chameleon every time we renew our act of consciousness (which is roughly every two seconds). Even when we try to maintain exactly the same intention across many renewals of our consciousness, we find that our intent drifts. This effort to maintain “the same intent” is called “concentration,” and you know how draining it is. It is easier to let intent wander until it coalesces into a generalized “purpose.” The function “is to” will never do that by itself. It requires intensification, which is a way of generalizing patterns of thought into the forms we have just studied. All of those forms are intensification along some possible line of intensive inclusion and intensive exclusion (“leaving aside”).

The analogy is maximally intensive, so far as our poor powers extend. Consider: “Bird *is to* Sky as Fish *is to* Water.” This imparts an implicit feeling of “moving-in-a-medium” and maybe the word “habitat” suggests the idea. It is purposive, but the purpose isn’t “stated.” For that, we need to know what a “statement” is. See



below. The “is to” function flits all over the surface of the analogy, and we have symbolized it with these: < >



The other function is the “as” function. It stands in the middle of the analogy, substituting for whatever word or phrase emerges from the four corners of the analogy. The function called “as” is metaphoric. It belongs to the context as a function, but it is really the **maker** or the **creator** of the context. It is “before” the context in time, and without it there is *no* context. That means we have to discuss how “as” can *do what it does*.

We know that “as” encompasses ten senses of “is,” but that just means that it can intensify “is to,” which makes function, as activity, all the senses of “is.” There is more to “as” than its support of “is to.” I will say now that the best word to understand “as” in its function is “motive.” There was a wonderful rhetorician named Kenneth Burke (1897-1993) who worked out this idea of motive in a lot of detail. If he was right (and I think he was) all reasoning is driven by motive. It is like desire, but involves reflection. You should look it up some time.

Looking Out My Barn Door

The big door of the barn, the one that opens out onto Rancho Logos (and from there “the world”) is not so narrow or hard to pass through as the door to the corral. If you are a poet or a creative imaginer of any kind, the big barn door is always open. Boring people either keep it closed or develop a power of ignoring whatever wanders in.

I also said this a few chapters back:

Ideas are really the source of conceptions, while, as you know, concepts are distilled from conceptions. An idea is an infinite source of conceptions, and they are very open-ended. You’re never really finished thinking about something when you treat it as an idea.

The bottom line is this. That big barn door is the door of your perception. Perception is an active synthesis of your experience (both conscious and unconscious) and



your memory. Perception is “as,” an intensification of purposive feeling, until it becomes “motive force.” There are four basic things a horse has to do to get in the big barn door and get itself “perceived”: It must have some qualities, some relations, some modality, and most important for logic, some quantity. This “quantity” is not Aristotle’s third sense of “is” and it is also not the quantity of “quantification,” this is the quantity of enumerability –the possibility of being enumerated, the *signate quantitate*, as I said, impressively, a ways back. (I don’t really know Latin.) The third sense of “is” and the quantification of propositions are dependent on the prior enumerability of the ideas that populate the context.

Count Me In

What does that “enumerability” mean? It means, basically, googol. (I spelled that right.) The Silicon Valley techies named their search engine after that for a reason. It is basically 10^{100} . How big is that number? Big. The mass of an electron (in kilograms) when compared to the mass of the whole known physical universe is more like 10^{90} , as best we can estimate. Googol is bigger than that, by quite a lot. So beyond your billions and trillions, and octillions and nonillions, and undecillions (10^{36}) and vigintillions (10^{63}) there is googol, and of course, beyond that, googolplex (10 to the tenth power, and the tenth power raised to the hundredth power). If you need a number bigger than that, you’re on your own.

The logical point, for our purposes, is that this number means “maximal inclusion,” sort of the number of all numbers, however you want to name it. Hell, call it Google. I don’t think anybody has that many ideas in their barn, but I think it is fair to think of Rancho Logos as *including* that many possible ideas, any of which you *might have*, looking out your barn door. It is about what is *possible*, not about what anyone or any group of us has actually already done. The examination of the meaning of “might,” of possibility raised to googolplex, must await another book. (Watch for it at your local bookstore or on-line bookseller. It will be written by me if I live that long. I don’t want your money for myself, but who will care for my cats when I’m gone?)

We can skip to “the whole of everything taken together,” but “under the limit of enumerability.” The same sort of limit can be described for those other requirements, quality, relation, and modality. The “idea” of “home” is as good an example as any. **To judge something as “home” is to interpret it not only so as to include everything it means, but also to exclude everything it doesn’t mean, and that involves *holding* its meaning (moving from “is to” to “as,” from intent to purpose), as an achieved judgment, over against *everything*, in the way of either including or excluding. It comes down to 1 (included) or 0 (excluded).**



Don't Count Me Out

Principles of inclusion are easier to understand than principles of exclusion, because *processes* of inclusion are easier to understand than *processes* of exclusion. When you ask yourself “why *didn't* I notice that?” *you have an infinite problem on your hands*. That is why we have handled the word “not” so delicately in this book. It opens out onto the infinity that is exclusion, is unthought, unperceived, unnoticed (*maybe* even impossible –but I doubt it; see the book that is unwritten but promised above).

When you have done a decent job of defining or determining, or at least listing, what you want to include, it is easy, *within* that task, to say why you *now* wish to exclude some things. But as to what exclusion (negation at all of its levels) really comes to, well, that is much harder to say. What you can say is that whatever is excluded “*is nothing to you*.” You don't let it into your intent. You block the “*is to*” function. It is the equivalent of asserting zero. So you will *treat it* as zero.

Is the excluded stuff *really* nothing (or impossible)? *Nobody* knows, maybe *not* even God. What, after all, is the status of the intelligible ideas (relations, modalities, qualities, and quantities) that God is *not* thinking about? Are they still real? You can say “God includes everything,” but you know as well as I do that this assertion isn't helpful for logic or for anything else. For us to *think* requires limits, and those limits seem arbitrary no matter how we cast them. Hence, googol.

I'm Sorry But . . .

I have to blow your mind now. It's part of my job. That big barn door? That is the threshold of your *experience*, and the stuff inside is what you can *perceive*. You can be conscious of stuff outside, but you are not synthesizing it into your perceptions. The stuff outside hasn't risen to the level of your notice (perceptually, actively, or reflectively). You have no intent for it, yet. To “take notice” means that an idea has crossed the limit of “number,” of enumerability. Such ideas have also conformed to a limit of **modality** (pure possibility has been made into potentiality *and* actuality –something you can act on, regardless of whether you in fact do act on it), and **relation** (everything in the barn “*is*” in some sense), and **quality** (everything has some appearances or characteristics or properties or attributes). With these limitations, you can *imagine* the idea. Without these limitations, it isn't an idea, it just flows into everything, is part of an undifferentiated flux.



The Flux Capacitor

It's an old movie, but you have probably seen it:

<https://url.rylanbooks.com/RnvO4>



Here are the specs, insofar as anyone can give them:

<https://url.rylanbooks.com/w76Jc>



What "idea" did Emmett Brown have when he hit his head on the sink? When you limit the proto-idea in quality, relation, modality, and (most important) quantity (1.21 gigawatts), you *have* the needed characteristics to *individuate* the idea further: to say what, within the barn, it includes and excludes. When dealing with ideas, the positive side (or you might call it "constructive") of this activity is determination according to inclusion, which is what you do when you classify things. To classify means to take some fundamental criteria and perform inclusion and exclusion on the idea. In the case of the flux capacitor, well, the limits suggested in number have to do with fuel (the amount of energy needed to propel the vehicle past the threshold . . . and that is, well, it's the barn door). As for quality, stainless steel is a quality that matters. As for modality, it became a potentiality in 1955 and an actual machine in 1984. As for relation, well, it's a time machine, so that question is complicated, but we'll get to it.

Outside the barn is the flux itself, unenumerable. Inside is space, present-ness, enumerable even if still unenumerated.

What Barn? Whose Barn? My Barn

There are about eight general ways this perceiving of time is made into purpose ("is to" plus "as") from raw metaphor to idea, in human experience. They are ways of *symbolizing* our experience against the background of whole horizons of *possible* meaning: the googolplex. These are motives, general forms of "as." It's like putting a filter or a screen at the threshold of the barn and saying "all the horses will now conform to this screen." (I am borrowing this screen idea from Professor Burke.) The main screens that we have created are: history, law, religion, art, economics, politics, education, and science.

Any experience can be interpreted according to one of these horizons of meaning. These are the main barns on Rancho Logos (in Western civilization, at least), and *their* motives. You can think of the process of civilization as a big barn raising.

We gradually differentiate and specialize our meanings against the horizon of possibility. These barns are like mega-symbols that stand *against* and yet *within* the great horizon of possible meaning. They are *includers* in the broadest imaginable way. They are *our* barns, first, and *my* barn only after I have grown up enough to run it on my own. Indeed, *my* barn is really just one perspective on *our* barn.

Closing the Screen Door

You'll want to know about these screens. Let me just give an example. You'll get it from there.

Say your grandmother dies. From the standpoint of *history*, maybe she lived from 1920 to 2020, and saw all the things that happened and contributed her own actions during that span. From the standpoint of *law*, she had a legal standing as a spouse, a mother, a daughter, a resident of some place, legal rights and duties, legal obligations and standing to sue or be sued, to do what was within the law or break it. From the standpoint of *art*, there is what she created, her expressive acts, and even how beautifully she lived her life, and the art that she took in, from movies to plays to paintings to TV. From the context of *economics*, you see that she did certain jobs, paid taxes, produced this or that, added value and used it in various ways. From a *political* standpoint, she was a citizen of some place, was governed by others and she also governed herself, voted (or didn't) and contributed to the political order or disorder of her community and state and nation. And, *scientifically*, she was a biological being, also with certain standing as a physical object, and could be studied and described by various kinds of measurement we carry out, which is what scientists do; she became a part of science every time she went to the doctor. She was *educated* to some level (not necessarily the same as schooling, right?), and that included being taught to speak a language, probably read, write, and to cipher.

All of these factors, these barns, *could* be involved in any idea, any candidate for the forms of association, and any candidate *can be* interpreted from within any of these contexts. You may remember that way back near the beginning of this book (chapter 5), I helped you learn to recognize that when you understand something that someone says to you, you make three kinds of judgments: success or failure, and true or false, but both of these are included in a broader judgment: interpretative judgment. The "success or failure" judgment is the "as" judgment. The true or false judgment is the "is to" judgment. The interpretive judgment is the intelligibility requirement, and that means quality, quantity, relation, and modality.

Now you know what you've been doing all of your life. You can thank me later.



The Flux is Fluxing

Outside the threshold, **as far as you are concerned**, is only the flux, only pure *time*. Within the barn is only *space*. Between is *number*. That is how you manage the difference between time and space. Indeed, that is what time management means. Put the time into some order of thought, and *voilà*, management. Still, in order to take notice of anything, it has to become enumerable, which means that it “endures” *as* the beast that it *is* (do you see the functions?) long enough to get it brushed and dried out, and watered and fed. Then you’ll want to find that pony a stall.

We can finally say what a *relation* is. The term “relation” has run through this book, and we know some things about relations: That “is” is the “relation of relations,” and that the “is₁” (substance) gathers all the ten senses of “is” into one great group. We know that in the UD, relations make elements into “visible” terms that can serve as either subjects or predicates in formal propositions. We know that we need to specify some relations in a schema if we wish to *do* anything with our elements in the UD. And, after all, aren’t reflexivity, symmetry, and transitivity relations? What about inside the barn, among the class members? The forms of association, those are ways of relating, right? When we constellate and classify conceptions, do we not also relate them? Association itself is surely a relation. And then there is the rich complement of relations in analogies. And now we know that “as” is the relation of intensity, and “is to” functionalizes “is.” And these all point to “motive,” which is certainly a relation.

You Are My Hero

It’s getting thick in here, isn’t it? Yet, out in the wild blue yonder, there is a broader world of meaning than any of these types of relation can capture. Outside the barn, beyond the Ranch, out in the pure flux, it would be pretty much *all* relations and no *things* to stand against the flux from within it. There is no meaning there as far as we can tell. You don’t want to visit.

Symbolization is our only defense against meaningless flux. What a heroic act it is to symbolize! How do we do it?

So, there sort of has to be a principle that helps us see where things start to mean enough to become “objects” for us. A funny looking philosopher named Michel Foucault (1926-1984) pondered this question. He called all the stuff that *could* have a meaning “discourse,” and it includes all our actions in speaking, thinking, writing, working, everything meaningful. He said this:

Discursive relations are not, as we can see, internal to discourse: they do not connect concepts or words with one another; they do not establish

a deductive [logical] or rhetorical structure between propositions or sentences. Yet they are not relations exterior to discourse, relations that might limit it, or impose certain forms upon it, or force it, in certain circumstances, to state certain things. [Discursive relations] are, in a sense, at the limit of discourse; they offer it objects of which it can speak, or rather (for this image of offering presupposes that objects are formed independently of discourse), they determine the group of relations that discourse must establish in order to speak of this or that object, in order to deal with them, name them, analyze them, classify them, explain them, etc. These relations characterize not the language used by discourse, nor the circumstances in which it is deployed, but discourse itself, as a practice. (*The Archaeology of Knowledge*, Part II, ch. 3)

That is a mouthful. But it's easy once you see this in light of what we have been doing. We started with a group of relations, Aristotle's ten senses of "is," and I said, way back when, that I didn't exactly agree that this list was adequate, but it was good enough for our purposes. And so it has been. But where did the list come from? It came from his culling of broader and vaguer "discursive relations," including all the things you *might* do, and *establishing* that group (**making stable**, making into barns, you know "stables") those ten senses of "is," in ways that we can use to classify, analyze, explain, name, and otherwise "deal with" all the actions that *might* bear a meaning.

Aristotle did a pretty good job. But out there in the wild flux of meaningless change, there is a limit, a fence-line, a borderland and horses (ideas) emerge from that fog *as* gruntings and neighings, and clippings, and snortings, and whinnies, and we have to say "whoah boy" and develop an alluring whisper to bring it onto the ranch of meaning. In short, it comes in as "expressive," as a raw build-up of emotion and action that exceeds its capacity to retain, so it releases that energy in expressive bursts.

The Horse Whisperers

There are word-whisperers, meaning-creators, cowboys of the edges riding the fence-lines of meaning. They can *interpret* these expressive bursts. They are called "poets." Our daily practice with words and concepts comes from and depends on *their* practice. The veil between time itself and their senses, perceptions, and intuitions is, shall we say, *thin*. I wish that was my own insight, but Henri Bergson (1859-1943) said it first.

The first meaning bearers for the human race were artists, poets and painters, who expressed (and still express) what they found at the edges of the flux and the places where they dwelt. They give us the metaphors (whether as visual images, as rhythmic noises, or as articulate words), and we do the rest, classifying and



constellating. Aristotle's word for this process is "poiesis" and it is a lot more than composing poems. It means "creativity." An interesting philosopher named R.G. Collingwood (I mentioned him in the last chapter) pointed out that this sort of artistic person can feel (and see) how sensation in its fluxing is already tinged with emotion. Most of us are numb to this, so our symbols are second-hand; but poets feel it.

The unit of creation is not the "word," however; it is an insight into the "discursive relation" that always comes out as what we will call "a statement." Foucault called it that too. Many others agreed that meaning is not created from just *combining* words, and certainly not from conjoining or disjoining or negating them. Logical operators are utterly uncreative. They are forms of repetition. There is something more basic, and it emerges in our practices of thinking and living, and of thinking *about* our process of living. These are ideas that arrive in a complex group that I call a "cluster." The *expression* of a cluster is a "statement." Statements involve at least two ideas, one of which is a relation, but usually the cluster is two or more ideas. They are the materials for forming propositions, lures for feeling.

The Starry Heavens Above

We talked about constellations of stars *as* an analogy for the way we might associate them from any perspective within the barn. I now want to suggest that out on the Ranch, where most people don't go, there are poets who see not just associations of conceptions, but clusters of ideas. That's what a horse looks like as it crosses the fence-line into the Ranch. It's a natural but wild cluster. It is a poetic statement. When it is stated, we ordinary people can feel its meaning. So, if you think about this, you'll see the analogy to constellations of stars.

But star clusters are groups of stars that *really are* close together. See the article [here](https://url.rylanbooks.com/3i7WY).



<https://url.rylanbooks.com/3i7WY>

So it doesn't matter whether you are standing on earth or on some distant planet orbiting a star in Orion's belt. We see a star *cluster*, and those stars are actually close together. Not so with the constellation Orion. It exists virtually, from our point of view. But a cluster is still a cluster from any point of view. Don't bother asking a poet how this clustering of possible ideas is done. They don't know; they just do it. But it has a name: abduction. They abduct a cluster, or are abducted by one. It's hard to say which, even when they have stated something. They can't explain it. It's ok to leave a little mystery at the fence-line. Call it "negative capability." A poet made that up.



<https://url.rylanbooks.com/GQjGr>

It's better not to know some things. There is a world of meaning and somehow we are the ones who make it. As another poet said: "There is meaning; and identity." And another answered, "That is all you know and all you need to know." (Mr. Whitman, meet Mr. Keats. Oh, I'm sorry, you've already met?)

Hopeful Souls

Some people have wondered if there is a small group of ideas, meaning-clusters, that are "inevitable," as so very *likely* to be thought of (made by poets) that these ideas have a special standing in the world of meaning. The idea of God, of nature, of truth, love, beauty, goodness, right, justice, even mercy, compassion, or yes, evil have been thought of this way. (Notice the conjunctions and disjunctions?) Some would say that the idea "God is love" is an inevitable cluster, and hence a sort of inevitable and self-evident "statement." Others would suggest "all humans are created equal," or some other well-worn truth of our time and place. These are statements that we *take as* clustered, but when we examine them closely, we realize that not all people have always accepted them *as* inevitable, as clustered, and that in fact, a lot of work had to be done to have them accepted *as* combinations. (Do you see the function of "as"?)

One great mystery, then, is how to think about ideas that really *arrive* from beyond the fence-line *as* clustered meanings, and to that I answer, they are *expressed* as statements, and the most basic unit is the metaphor. Now, in a way, you learned all this already, along the way in the book. Logic is about thinking, and thinking is already a replacement for your full experience, and is also a substitute for action. So there is a lot of work done for us, by others, when our individual ideas appear. We substitutes their efforts for our own. Their clustering is at bottom, a nearness of ideas, in time, to one another. Philosophers would say a "shared temporality." That is a very hopeful suggestion. It may be wrong.

However else they may hold together, the ideas came to the poets in temporal proximity, as clusters, not just as constellations. If they do not come that way, we really cannot notice them, they cannot emerge, for us, from the flux, and if that were not possible, we could not state them. But when they do appear, they suggest that if we work with them, they may become clearer to us. (Do you remember how Wordsworth would greet his friends? That was several chapters back.)



Time Is the Possibility of Relation

Time is pure flux beyond the Ranch, as far as we know, but when we get to the fence-line, the ideas partake of shared environment that we will call “causal efficacy.” (Not my term; I stole it from that guy Whitehead.) In a sense, they can now *cause meaning*. But they are still wild, in transition, and to get them into a barn, any barn, they must be made into *symbols*, images with limits and form and content. We take them from the poets and lay their meanings over the top of their existence like blankets and saddles, and we feed and water those snorting symbols until they are ready for more grooming, and perhaps training and riding.

The fundamental aspects of the symbol are time, space, and number. The logic of time is a logic of possibility. We are not studying that here. The logic of space, or spaces, is what we have studied in this book. Everything you have learned is a way of spatializing meaning, of setting it before yourself. That philosopher Bergson calls it the “law of contiguity,” which means presenting meaning to ourselves as inhabiting a virtual space we both create and perceive. The barn is the space of presentation, of present-ness, of the temporal present, which is the present moment stretched out in space where certain kinds of activities (mental ones) can be enacted.

We call this space (regardless of which barn we have in mind), “presentational immediacy.” (Again, Whitehead’s term.) When a horse is not in a barn, it is absent from there, a nada, but it may be present elsewhere on the ranch as a cluster of ideas (even if no poet has yet put a lariat on it). The presence of such a cluster lies in the future for us, but its intelligibility to us is the nearness or proximity of some “ideas.” If it has not crossed the fence-line, we don’t talk about it or think about it, but imagination might go out there and do things we don’t understand. The poetic genius makes such forays, but it is dangerous to one’s sanity to go into the pure flux. Don’t go unless you have to.

EXERCISES:

The edges of Rancho Logos are very wild and not a safe place for logic students. I can’t ask you to be poets. Since we can’t just demand of ourselves to be poets, maybe we can do something else to get an experience like that. Let us go back to the random word generator we learned about in chapter 14:

<https://url.rylanbooks.com/PuaYj>





There is also a random synonym generator:



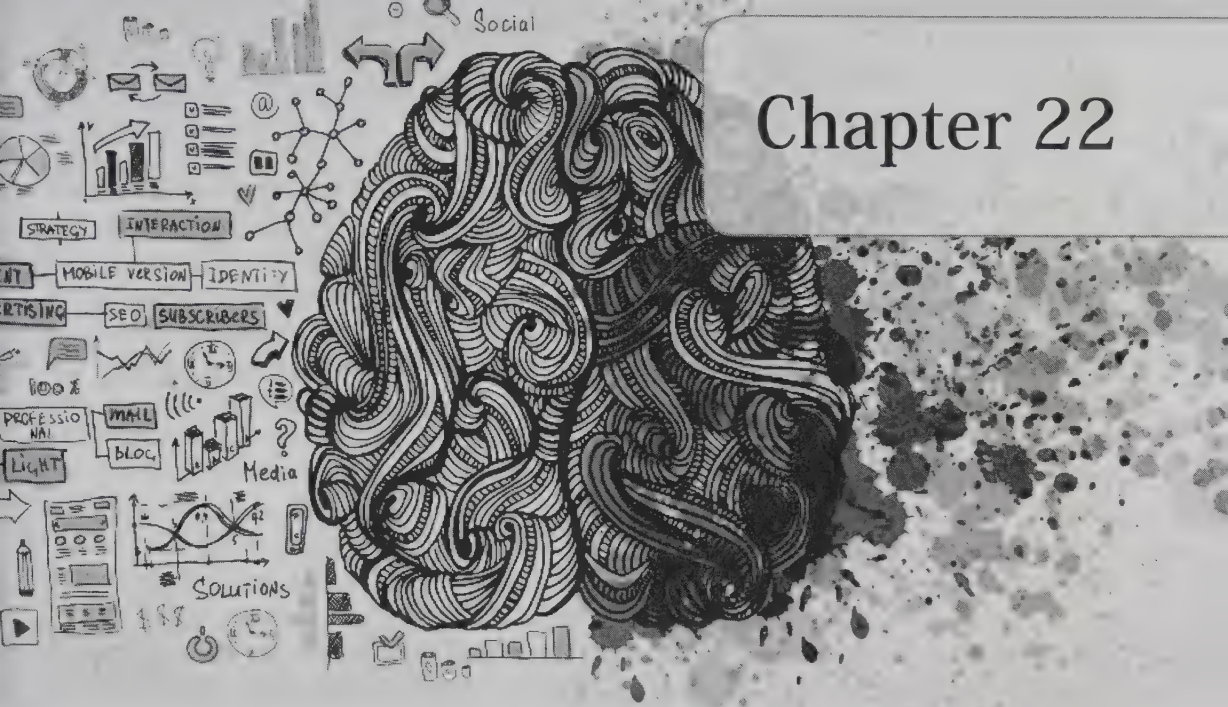
<https://url.rylanbooks.com/jlVqx>

These are very different. The first will give you lists of words that you can constellate, but that are not clustered. The second introduces a limit function of a fairly strict sort: the words must share approximate meanings. They are clustered.

1. Use the random word generator to create a list of six random words. List them. Do you see any incidental associations? Can they be placed in comparison and/or contrast, according to nonlinear or linear patterns of thinking? Choose at least three and constellate them according to one of the patterns of thought we learned in this chapter.
2. Take the three or more words you just constellated and plug each on into the synonym generator. List your results in columns.
3. Look at your diagram for #1 above and compare the terms you used the with the synonyms for the generated by the synonym generator. Can you "improve" the thinking pattern by using synonyms? By improving it, I mean intensifying it, make it feel like it point to some purpose? If so, explain in a sentence or two. If not, why do you think this didn't work? (Hint: it usually does work, so you may need to exert your imagination a bit.)
4. Choose one of your words with its group of synonyms and think about them in terms of the (a) quantities, (b) qualities, and (c) modalities. What relations come to your mind under each heading? This requires three lists, followed by a fourth list of relations. (You are classifying class members.)
5. Choose one relation that especially instensifies the class members and set the class members into an analogy, using "is to" and "as." Write out the diagram. Does the analogy fit the relation you specified with the sense of "as"? If your are not satisfied, put your chosen relation into the synonym generator to see whether you can improve the analogy.
6. Now survey your whole class, all the class members you have written in their various associations. What could you do with these conceptions, these predicates that could be transformed into concepts? Imagine a potential UD and name it.



CHAPTER 21



Chapter 22

FORMALIZING CLASSES

Counting Your Blessings

For the sake of logic, and especially for understanding classes and forms of classes, the point about number is the main point (I am not dissing space and time, but logic takes them for granted). It turns out that there are two *forms* of inclusion, with their complementary *forms* of exclusion, when we consider class membership. These apply so universally to this process of symbolization that we can effectively use these principles of grouping to communicate with any part of the universe that *can* be communicated with (by us).

The system was devised by a dude named George Boole (1815-1864). You have heard of him. He and another less well-known dude named John Venn (1834-1923) created systems of representing the inclusion and exclusion of whole classes of things that could be



manipulated in a fashion similar to arithmetic. But it isn't arithmetic, it's a kind of algebra which can then be presented in geometric pictures, "presentations" (Venn diagrams). Now you'll ask me what's the difference between algebra and arithmetic. I told you, algebra doesn't deal with numbers, it deals with groups of possible numbers. " $1+n$ " right? What is " n "? Any number that can be added to " 1 ." It's a group. You're not just counting anymore. These forms of reasoning are about *classes* of numbers. OK?

Boole said that this process, this algebra, is not the way we *actually* think, because if we thought in his algebra we would never make a mistake. (So he claimed.) And *we* do make mistakes. Rather, Boole's system is a procedure that describes how we *should* think. It is "normative" for thinking, as is all logic. The procedure does not make mistakes. It includes what it sets out to include, and excludes what it sets out to exclude. But in order to be so perfect, it has to reduce the possibilities to just two: either the conception is wholly present (in which case we call it " 1 ") or it is wholly absent (in which case we call it " 0 ").

Basically that means that when we want to do class logic, we have to close the barn door to anything that is not enumerable. If something unenumerable is in the barn, we ignore it, treat it as wholly absent. Our conceptions can be very numerous, going up to googol plex, even, but when we commence our algebra, we treat everything we are thinking about as whole and fully actual (a "candidate" for determination), or as wholly absent (not a candidate for determination).

Outside on the ranch there may be possibilities running around that we are not considering, but at the threshold of any barn, which we call "your experience," or mine, or someone's, everything that crosses into the barn is actual. It is a "quantum," or is "quantizable," to use that word in its true sense, a unit that you can analyze but cannot actually divide.

You Rock, You Rule

In chapter 20 I gave you a rule:

Where x is an element of some UD ($x \in \text{UD}$), and some class C includes that UD ($C \supseteq \text{UD}$), therefore ($x \subseteq C$) and reciprocally, $C \supseteq x$.

So proceeding with what we have learned in *this* chapter where C includes x , and $x = x$ (x is reflexive), then $x = 1$. Otherwise, $x = 0$. The reason for this norm is that when it is unclear whether a class member can become a determinate concept, for the sake of clarity in our determinate thinking, we have to treat whatever has *not yet* been fully conceptualized (made into a determinate concept) as suitable for use as a predicate *only*. It is a conception only, a field of connotation only.



When you name the beast, name a reference, as you have been asked to do many times in this book, this reference is an x that has been placed in a class (in the barn) but is not yet determinate. That is to say, we don't know enough about what it means to use it in our reasoning. It must be "intensified" before we can use it for our reasoning. What that means is that we must compare and contrast it to something. It is presumably enumerable but not yet enumerated. We have not rendered it discrete (a quantum), and that means we have to decide (and it is a "decision") whether $x = 1$ or $x = 0$.

Where $x = 1$, then $x = x$, and vice versa. We write this as such: $x = 1 \diamond x = x$

The symbol " \diamond " is mutual and exhaustive inclusion, or total "entailment." To satisfy the norms here, our unit is now "discrete," which means it has been intensified. One part of intensification is enumeration. The other aspects are "making determinate," and that is what we do when we transform conceptions into concepts, which you have learned how to do already. Enumeration plus determination is "individuation," and individuation is what *permits* "distribution" (one can make an assertion about each and every individual in a class, whether as members, or as elements of a UD, or as terms. Individuation does not *require* distribution, only permits it. This process is what warrants the treatment of an element in the UD as a subject term.

A term can be used as a predicate without intensification, but in formal reasoning, all middle terms must be intensified. In a UD, you can make assertions about all the elements, or none of them, or some of them (that is, you can "quantify"), but you cannot make assertions in an argument that uses unintensified terms. (People violate this norm all the time, but what they have asserted cannot be made clear enough for logical analysis.) Such unintensified terms are "not yet" included in the UD, even if a term bearing the same *name* is in the class.

These are norms of reasoning, not rules of logic. You have to follow rules, but you rock if you also follow norms as well. When you are massaging a reference, trying to name it, you are naming it for *use* as a class member, you are feeding and watering and grooming the horse, keeping the idea alive and healthy, as it were, but certainly not riding it. You should not do that riding thing on a horse you just named. It's a bad idea.

Working with these horses is a process of abduction, guessing what they will and won't do, as we learned a few chapters back. It is bringing things we are barely conscious of, that we barely feel, into full presence (from experience to perception). If we have not done this work, the horse is unavailable in the corral, and ought not be treated as even usably present in the class. For our reasoning, it is effectively nothing, nada, bupkis, nil, zilch . . . and if you treat it otherwise, don't be surprised when you start producing bucking and bolting paradoxes.



Hard to believe, but . . .

Add this norm, then: $x \neq x \diamond x = 0$. The symbol \neq means “not yet.” If you have done due diligence in this course, then, you will see that this norm holds:

$$C \supseteq x \diamond (x = x > x = 1) \vee (x \neq x > x = 0).$$

The “ \vee ” here must be read as “intensive exclusion,” as “also a not yet but do-able.” The “ \vee ” does not mean absence. Absence would be $C \not\supseteq x$. It is a further step beyond absence to say C *can never* include x . That relation is beyond our power of knowing, and if you say such a thing, expect both paradoxes (antinomies) and endless dialectical arguments that achieve nothing.

It may be hard to believe, but this simple norm: $C \supseteq x \diamond (x = x > x = 1) \vee (x \neq x > x = 0)$ is all you need (along with everything else you have learned in this book) to turn your class members into units suitable for use in Boolean algebra. You also have the principles for COBOL and Basic computer languages, and enough information to make the two fundamental Boolean moves. (See below.) On the left side of this exclusive disjunction, you have the basis of Boolean addition and multiplication. On the right side of the disjunction, you have the basis for intensive exclusion that is open to *becoming* intensive inclusion. These are Boolean negation and entailment.

I will only say something brief about the right side of the disjunction for now. The reason is that there has to be an exclusion function that is “strong” exclusion, and it is (so far) not possible for us to program this kind of exclusion into a computer. Google uses *you*, yes *you*, as the right side of the disjunction. You are the master of negation and entailment, Google is the mistress of Boolean addition and multiplication. The dumb thing needs *you* to tell it what to exclude in *this* sense of exclusion. This is *like* “leaving aside,” but what you exclude in this way isn’t even *in* your class, *yet*. It may be out roaming around on the ranch or even further off, amid the flux. You don’t know. It is, in any case, *absent*.

If you are following closely then, in a moment you will see that there are two senses of “nothing”: “not yet,” and “0.” They are not the same. Strong exclusion (“not yet”) means, to our logic, “absent for now.” 0 means “present but not now in use.” The first “nothing” can be interpreted as an open circuit, uncompleted. Its completion, its complement is assumed to exist, but is not sufficiently discretized, individuated. The second sense, 0, is a closed circuit with no current flowing at the present moment. This second case is “present but not in use.” It is “off.” That’s what 0 means. If you turn it on, voila, it is “on,” which is to say, “1,” which isn’t nothing at all.

What you *know* is all on the left side disjunction, but within that, there are two

possibilities: 1 and 0, and 0 is *not* a complete “nothing,” it is unused presence. The null set is therefore not complete “nothing,” it is 0.

Congratulations. You have now learned to go from images to digits. We are actually finished. It’s mop-up work from here, and so simple it’s hard to believe.

Stuff You Already Know but Never Really Understood Before

You do realize that your math teachers taught you *what* to do in math and *how* but never taught you *why*? They taught you how to find a square root, but they never said why that was important. You may be sad to learn that taking square roots is a method for turning numbers into *actual* squares. Take a number, say 16 (to make it easy). Square root of 16? 4. Expressed either 4^2 or $\sqrt{16}$. These are instructions for *drawing a square from the number sixteen*. The needed unit is four (it doesn’t matter four of what, whatever unit you like, as long as $4 = 4$), and you can draw a square (all sides equal) by using four as the unit length of each line.

Every number *is* a square. Already. You only need the unit in order to draw it. You may never need to draw a square from a number, any number, but then, it would have been nice to know that was what you were doing. If you are an architect or an engineer, these things are pretty important.

It gets worse. You learned $A = \pi r^2$. Put in your favorite number at A (area) and these are instructions for turning your favorite number into a circle. Every number already *is* a circle, and every number is a triangle too, and every number is already every polyhedron you can imagine. You simply have to ascertain the unit. Your math teacher didn’t tell you this, although I believe they mostly do know it.

Many of those math teachers do not realize that a line is a moving point, a plane is a moving line, and a solid is a moving plane. But it’s true. They didn’t tell you because their teachers didn’t tell them.

Don’t be angry, but now *you* have an actual grasp on what “digital” really is. It is a very abstract kind of reasoning about classes. It requires two ideas about nothing, not yet and zero (and the difference between them) and a fully discrete (individuated) unit we call 1. 1 is the loneliest number because it’s the only *number* in this system. 0 is more of an omni-function, that means “nothing yet”; it is the combination of “absent” and “not yet,” since “not-in-use” *comes from* “not yet” by means of intensification and individuation –take the quantum and make it an individual. Let’s remember, then, the rules (really they are norms, but if you want to rock, you’ll observe them faithfully in your thinking).



A Boolean Search

This is about to get a bit mathematical, but the math is pretty simple, and you probably did at least some of this in high school. You just never knew what it really meant (unless you had a very good teacher). But these are the principles of images-to-digits are what's behind your Google search. Remember, you are the prime excluder, but there has to be exclusion in order to rank your character string in priority, according to what it most intensively includes at the top (and even rankings within those top results are based on the site's inter-connectedness with other sites). That ranking is a kind of maximal toward minimal intensity of inclusion.

At the top is "I feel lucky" and that is the "1" on all Boolean relations explained below: the inclusion that includes all the others, as arranged by intensity. We call it the "universe class." Whatever is placed below (entailed *as* 0, *as* in not 1, expressed $\neg 1$) is still ranked according to the norms below. Notice the "*as*" here. The Boolean relations are really "is to" relations, and their output is an "*as*" relation.

When we consider a class from among the many classes we may posit in the barn, we call that class a "system." We use non-italicized lower-case letters as names for the individuals in that class. The "cardinality" of the class is the total of the class members, fully individuated (and that includes their being enumerated). The "ordinality" of the class (the Google ranking) is the sequence in which they are ranked under a determining relation, which we call a "form." Clearly the "universe class" is exhaustive of the cardinality of a given class. But that tells us nothing about its ordinality. For that we must rank each individual according to some finite criteria.

Take this example:

The system is $C(a, b, c \dots)$ under the relation fh

int : is_1 "creatures in the relation of fellow human being."

This " int ." just clarifies the relation; it is an "interpretation" of that relation under is_1 . There are some common concepts that have the character of being general enough to gather a whole class. "Fellow human being" is one. "Mortal human being" is another, presumably. There are many such "wholly general" common concepts.

Our class is "human beings." The defining determinate form is " x must have fellows other than himself/herself." We assert:

$(\forall a)(\exists b): (a \text{ } fh \text{ } b)$



This says that for any cardinal “a” we can find, there is at least one cardinal “b,” such that a is the fellow human being of b. This expression achieves the universe class by including every C-member. We call it “1.” These are not universal and existential quantifiers, such as we use in a UD, but they are the *basis* of those UD quantifiers (All, Some, and None). The “b” in this formula must be a cardinal b, but it could be any cardinal member of the class. We call it “b” because we need a placeholder, not as a “name” for the member, just a tag or marker.

What these expressions really mean is that, assuming the cardinality (full individuality) of any member (or grouping of cardinal members), there should be some other cardinal member (or grouping of cardinal members) that *is to* the first *as* the first *is to* itself (reflexively). That is the promise made by “is₁” in summing all the senses of “is” under one exhaustive meaning. Note that we have already determined that “is₅” has been satisfied, because $x = x$. (It’s like Two factor authentication for your various devices, so think of it that way –you are saying “yes, I am the person who owns this account and yes, I am the person who owns this phone, so $x = x$.”)

Now consider this norm:

$(\forall a): \neg(a \text{ fh } a)$. This form also includes all C-members. It says that for any cardinal member, that member is not to itself as it is to the others. Basically, any cardinal member is “either a or it is not a,” under relation fh. This assumes the unique cardinality of every class member, and also distinguishes “is to” from “as.” This form is also “1” by the same criterion, and of course $1=1$.

We chose fh because it applies to all members of the class. That is why you always want to seek a substantive expansion that holds of all class members. Such relations are usable in class logic and don’t lose their meaning when moved to a UD. Not all relations are like this. There are senses of “is” that resist being gathered under is₁. If there is a “pure quality,” it would not be gathered under substance. But I don’t have any experience of “pure qualities,” so I don’t worry about such things.

“You See This? This is This.”

Robert DeNiro delivered this memorable line in the film *The Deer Hunter*, while holding up a single bullet. It takes on symbolic value later when his friend becomes obsessed with playing Russian Roulette. Warning: there is rough language in this clip (I am extremely unhappy about some of the abusive views expressed here, but it’s a movie, Oscar’s best picture that year, 1979, so in the name of art and realism, I try to overlook the views expressed by the characters):



<https://url.rylanbooks.com/oGc4W>



Making decisions, intensification, symbolization, creating unique individuals for our reasoning, is not a painless process, and it's not free. So, you can see, with the help of our film clip, that there is genuine depth to saying that $1 * 1$. It always involves using what Gilles Deleuze (1925-1995) called "distributed concepts," such as: this, that, those, here, now, and so on. These special concepts "index" (they *indicate*) what members of a class (in the barn) are to be taken to the UD (the corral). Any member not yet under a distributive concept is already enumerated, but it is not yet indexed for use. These distributive concepts help us select class members that will serve us better outside of the class, because in a sense they are still *in* the class as a "this" or a "that" (and not something else), or a when or a where (the senses of "is"), even *while* being worked on in the UD. We don't need the details, we only need to grasp that $1 * 1$ is no obvious matter.

For us, $1 * 1$ is a way of saying the universe class has been found or "achieved." Obviously " $(\forall a)(\exists b): (a \text{ fh } b)$ " and " $(\forall a): \neg(a \text{ fh } a)$ " say different things. But they have the same output, and that output is the universe class (1). This is this, this is not something else. Hence these statements are *logically* identical. It is very handy for science to be able to say things in more than one way. So, if we formalize "Thomas Jefferson" and "the author of the Declaration of Independence" as class members, these also = 1 (a universe class), as outputs to various questions or problems. But they don't say the same thing.

Adding It All Up

The Boolean + (addition function) works like an inclusive disjunction. It provides us with these pairs of related forms:

$$\neg(a + b) = (\neg a) * (\neg b)$$

And

$$\neg(a * b) = (\neg a) + (\neg b)$$

You may recognize the similarity to DeMorgan's theorem in this, but that isn't what it means. The "and" represented by $*$ is not the operation of conjunction we learned earlier. You can logically *conjoin* elements only *after* they have been shown to be *combinable* at the level of the class they came from. If you look back through the book, you will see that the word "combination" has been used this way throughout. "Combinatorics" was developed in the early 17th century and has been an important part of intensive reasoning ever since. In short, the members have to be enumerated and indexed before conjunction means the "and" of UD



logic. These indexed elements belong to a “plurality” that is the class under $x = x$ or is_1 . The further study of those relations is combinatorics. Look it up some time when you’re bored.



<https://url.rylanbooks.com/AasGM>

It All Comes to Nothing

What about: $(\forall b): \neg(a \text{ fh } b)$? The output is the null class: 0. It says that there is at least one human being (a) who has no fellow human being in the “specified relation” (this must be a distributed concept). That means the relation does not hold across the entire class, and so will not do as an “as” relation. The “a” is unbound by an enumeration, and yet it is in the mix, when we examine the class. That “a” has been “deleted.” It comes to nothing, now.

Think of it this way. In order to go up a ladder you have to delete your foot’s presence from the lower rung. That’s all this says. Still, it finds the null class because of the defining form (“is a fellow human being of”): it is thus “0.”

What if we add:

$$(\exists b)(a) : \neg(a \text{ fh } b) * (a \neq b)$$

This formula clarifies that this class is not a unit class, that it has more than one member. We may still call it “0” even if it is hard to imagine. But Langer says, “imagination is no measure of logical possibility or fact.” (*Symbolic Logic*, p. 129). Unfortunately, she is right about this. There are things you’ll have to accept in virtue of the rules and norms that you can’t really think through. We discussed this back in the chapter on analogy, when we talked about extensive exclusion. Well, now we’re back to that.

In a formal context, with extensive inclusion as the criterion (and that is class logic, the difference between enumerable but unenumerated, on one hand, and actually enumerated, on the other):

All combinations that pick out everything enumerated are about (“is to”) the same everything and = 1. You can also call it “this” or some other distributed concept.

All combinations that pick out less than everything enumerated are about the same nothing and = 0.



These two are always correlative. When you have found one, unambiguously, you have found the other, which is its “complement.” “Nothing” is as useful as “everything,” if harder to think about (although easier to symbolize). When you know how to *exclude* the universe class, then, how to achieve 0, you have one path to *including* the universe class, very abstractly, as a complement.

This brings us to our final point. What you have learned, by learning to achieve 0, to intensively exclude the universe class, brings us finally to a full understanding of “intensive inclusion,” which comes down to the reasons, conditions, hypotheses and ground of conserving meaning through a series of logical transformations. Computers can’t quite do it, at this point in time. But you can. In fact, you do it every day. It is called “thinking.”

We have formalized that process in this book, to the extent it can be done, at our present point in history. You can work with these class forms, and they can be developed in a number of ways.

EXERCISES:

This will be perhaps less fun than other exercises because you really do have to manipulate some symbols here. And there is more than one way to accomplish these tasks, not so much right and wrong answers as better and worse. But if you are going to learn to analyze things using logical forms, you have to be able to do it yourself. I will get you started by reminding you of how to set up a UD, but now we will be going back to see what has to happen with class members prior to their becoming elements in a UD.

Let the system of class/UD be this form:

$C = (a, b, c \dots) dc$

int: $dc =$ “characters in stories by Charles Dickens”

Schema:

N = Little Nell Trent

C = David Copperfield

T = Oliver Twist

E = Ebenezer Scrooge

You know there are more Dickens Characters than this. Many more. But these are the ones you need for your **purpose**, which is to compare and contrast



representative characters created by Dickens to determine which inspires the most pathos (sentiment and co-feeling) among readers. Pretend this is for a paper in an English Literature class. But your teacher has never seen an analysis of the sort you will do now. You might want to Google these characters quickly to learn the facts about them. Go ahead. I'll wait.

Our UD can be called "Main Characters" from the class of Dickens characters, in the barn Fictional characters, on the part of Rancho Logos called, loosely, humans.

The defining form is "x must be the center of a story."

We assert the following form:

$(\forall a)(\exists b): (a \text{ dc } b)$

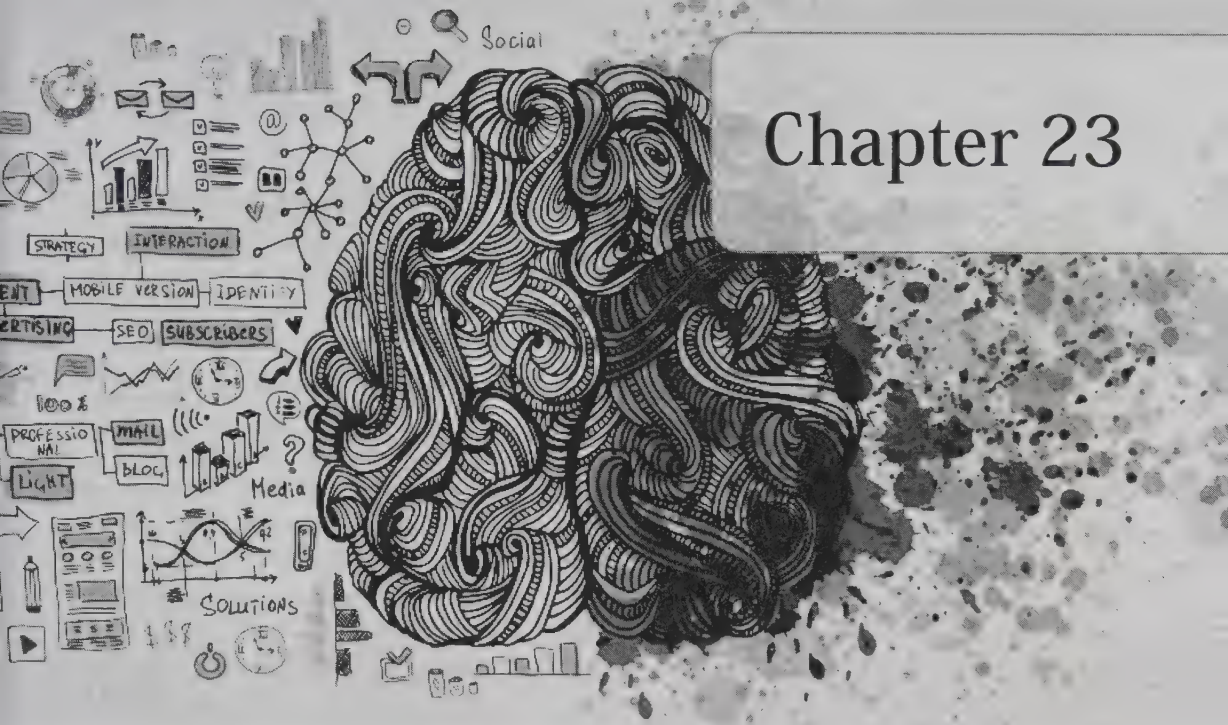
1. Using the UD provided, give at least one interpretation of this form.
2. Does your interpretation achieve the universe class?
3. If not, then it = 0. can you find an interpretation of this expression that does achieve the universe class? If so, can you re-interpret it to = 0?
4. Keeping in mind your purpose (this is like "find Tom" in the chapter), you are looking for a way to compare these characters to achieve something like x is the most pathetic Dickens character." (To people who know Dickens, the answer to this purpose is pretty obvious, but let's assume that not everyone knows this.) So here is your task: If you do not achieve the universe class with your first interpretation, can you make the relation dc more specifically or more generally to achieve the universe class (keeping the same constants)? If you do achieve the universe class with your first interpretation can you interpret the relation dc more specifically or generally to achieve 0 (keeping the same constants)?
5. Now consider this form: $(\forall a): \neg(a \text{ dc } a)$. It is asking about the reflexivity of the characters. Seems vacuous, no? But remember your purpose. Reflexivity of the relation plays an important role connecting the class member to the element in the UD. The question is whether the conception of the character makes any difference to the concept of the character. Move each character from conception to concept in your mind. Hint: The conception of the character is more about the way the story makes the character; the concept is more about how the character makes the story. You have only looked at summaries of these stories. Unless you've read them and really thought about them, you are aware that you just don't know how to achieve your purpose. But now:



Choose three main characters from three movies you have seen, movies that really made an impression on you. Do everything we just did in 1-4 using your own class and UD, and then use the reflexivity formula to think about which main character is the most pathetic, among the three you chose.

When you have come to *your* version of number five, write a paragraph about which is the most pathetic, and why. It may make it easier if the movies you choose are already related in some “external” way—same actor, same director, same writer, something that gives you a latent identity that undergirds the comparison and contrast.

Now, think about why that commonality (same actor, director, writer, etc.) helps with the transition from class to UD (from conception to concept). We had that advantage with the assignment above—it was all Dickens. What work does this “ground” do in helping us think about things formally? I’m not asking you to write about this. I’m asking you to think about it. If you want to be better at thinking when you finish this course, you’ll do what I’m suggesting, even if you don’t get a grade for it.



Chapter 23

THE PATHS OF INCLUSION

A Valuable Discovery

We have, through these many chapters, shown you a path to a great discovery made by Alfred North Whitehead. In 1929 he published a series of definitions and assumptions that showed how what he called “extensive connection” could be modeled. That means actually connecting what is intensively included to what is intensively excluded, and you have just learned to do that. Now it is time to learn to understand what you have done, and to get a few final tools in your toolbelt for using this amazing thing you can now do.

Susanne Langer, who was Whitehead’s student (as was that weirdly named dude Quine, and a bunch of other pretty good logicians), parsed and explained this theory of extensive connection as five



paths of "inclusion." The fifth path really describes intensive exclusion. The other paths are the basic forms of intensive inclusion. The logical formulas can be represented in Boolean shorthand. That makes them usable as 1's and 0's.

The Five Paths of Inclusion

$$1. (\forall x): [(x > D) \supset (x > C)] \cdot [(x > C) \supset (x > D)]$$

Remember that ">" means "is to." This formula (#1) is called "**Mutual Inclusion.**" It could be said "For any class member, if a member is to some concept D a necessary condition for it to have the same "is to" relation to the whole Class, then that complex is combinable with the case where the converse (is also a sufficient condition) holds. Where this = 1 we have the logical identity of two defining forms (same extensive inclusion, two defining forms, thus same class).

This is: "A = B" in Boolean shorthand.

$$2. (\forall x): (x > A) \supset (x > B)$$

This is called "**Complete Inclusion of a Lesser Class in a Greater.**" It can be said "For any cardinal class member, a class member that is to some common concept A, that member is a necessary condition for it to have an "is to" relation to a second common concept B." Where this =1 we have found all of A, but not necessarily all of B. This is:

"A < B" in Boolean shorthand.

$$3. (\exists x): (x > A) \cdot (x > B)$$

This is called "**Partial Inclusion**" or, more importantly, "**Overlapping Classes.**" It can be said "There is at least one class member in which that member *is to* a common concept A such that the same member can be combined *as it is to* some second common concept B (and its whole class)." When this =1 we have found the complete overlap of two classes relative to at least one real member; the extensive inclusion of two defining forms thus defines a sub-class shared by both common concepts, A and B, i.e., having identical members. This is called the "**product**" of the relation between the A class and the B class. This is also called successful combination, where it =1.

In Boolean symbols:

$$[(A \times B) < A] \cdot [(A \times B) < B]$$

$$4. (\forall x): [(x > A) \cdot (x > B)] \supset (x > A + B)$$



This is the generalized version of this propositional form, in a UD: $(x \in A) \vee (x \in B)$. The UD symbols are a disjunction at a lower level of generality. But it is a form of inclusion at a higher level. Whatever is disjoined in propositions must still be combinable at the level of class membership.

This is called “**Joint inclusion**.” It can be said, “For any class member, when a member is a common concept A as combinable with B, this relation can be treated as a necessary condition for expressing that member’s relation to those common concepts as a union of the concepts. Remember that Boolean combination is like inclusive disjunction: either this or that or both. Where this = 1 we have found the universe class relative to a specified member (that it *must* be included in at least one of the two classes, perhaps both).

This is called the “sum” of A and B. In Boolean shorthand: $A + B$. Where this = 1, A is a sub-class of B and vice-versa, since where A is A, A is also A or B.

The existential import of joint inclusion is captured in this:

$$(\exists x): (x > A) \vee (x > B)$$

That will surprise some people, but as I have said all along, you’ve got to exist (in some sense) to get into the barn, so it should come as no surprise that all of these formulas assume existence. 0 exists. It is not absence. In fact, it is maximal information about what is intensively excluded.

$$5. (\forall x): [(x > A) * (x > B)] * [(x > A) \supset \neg(x > B)] * [(x > B) \supset \neg(x > A)]$$

This is called “**Complete Mutual Exclusion**,” which means that everything must be *included* in one class or wholly excluded from it. Now we have arrived at the reason why contradiction is not a law of the real universe. Complete Mutual Exclusion is a kind of inclusion. It is pretty hard to say this, grammatically, in English, following the symbols. I will simplify.

The combination of “x is to A and x is to B,” can be combined with a form treating both concepts A and B, as necessary conditions for the absence of the other. Strangely, when this = 1, we find the universe class by asserting that all members in C (candidates for class membership) must be either wholly extensively included in a defining form or wholly excluded from that defining form.

These A and B are not common concepts but distributed concepts, and this is a very powerful norm, almost a law. (It also explains the mysterious and useful O-proposition in a more determinate UD, with its distributed predicate but a subject term whose distribution is irrelevant to its implications.) We achieve the same knowledge from this form as we achieve in overlapping classes (Form #3),



but by way of exclusion. So where 3 is "contingent" and "empirical," this norm (#5) is "necessary" and purely logical. By combing A and B under number 5, we can get at all *members*, not just as actual members of a class, but as candidates for membership in any determinate class. This limits the class. The right side of the form takes in as a class member every candidate that fails to be extensively included in A. So, both classes are wholly determinate, there is no overlap of members, and each class is the full "complement" of the other.

In Boolean: $A \times B = 0$.

That is a pretty rich 0. It is the 0 of full complementarity, and that never really "happens" in our world, not even really in computer programming. The complement is usually just everything and anything in the universe we didn't happen to include, and we say nothing about whether the excluded stuff was or wasn't full of fitting candidates for inclusion. But not in norm number 5. There we say everything excluded *was* a fit candidate for inclusion. That makes the concepts (A and B) vague, like "this."

A common concept, like "cat" or "wedding" or "cake" just isn't general enough to use this fifth kind of inclusion. Only distributed concepts can be used. But here is a secret you may not want to learn. If you are talking to a computer, all concepts are distributed concepts *to it*. It doesn't care whether the stuff that is absent merely happens to be absent (the third form) or *has to be* absent (the fifth form). And computers are stupid, so you can't explain the difference to them. But you can use the third form and make them seem pretty smart.

Thus, we now have this table which will tell you the conditions for achieving 1 and 0 under the forms of inclusion we have learned. Remember, 0 is still inclusion, it is just less than the universe class.



Boolean Tables:

Product				Sum		
X	0	1	+	0	1	
0	0	0	0	0	1	
1	0	1	1	1	1	

Negation				Entailment		
\neg	0	1	\supseteq	0	1	
0	1	0	0	1	1	
1	0	1	1	0	1	

These relations are often expressed in slightly less mathematical terms. We have stated the inclusions using only two concepts above. But these can be expanded for a serial form. Below is a chart showing how to serialize the inclusions, and this is at a still higher level of generality, since all the concepts must be distributed concepts for these formulas to work, "to run," in computerese. But to your computer, there are no "common concepts." All of them are just "this." Distributed concepts. The formula at the bottom of this table re-parses the Boolean \cdot (combinability) as high-level presences, absences, and combinations, represented by \vee and \wedge . Here you have something you can use in thinking about the form of serial predication. We learned it as contingent inclusion (number 3 above), but it can be taken as discrete sequences, as it is in this chart. One need not stop with just three members (here tagged as p , q , and r). These forms can be expanded indefinitely.



p	q	r	<i>table value</i>	
0	0	0	0	
0	0	1	1	$\neg p \wedge \neg q \wedge r$
0	1	0	0	
0	1	1	1	$\neg p \wedge q \wedge r$
1	0	0	0	
1	0	1	0	
1	1	0	0	
1	1	1	1	$p \wedge q \wedge r$

$$(\neg p \wedge \neg q \wedge r) \vee (\neg p \wedge q \wedge r) \vee (p \wedge q \wedge r)$$

Out in the Big Bad World

We close this expansion of what we have learned by reminding ourselves that no matter how clear we are about our meaning (and it can't get clearer than number 5 above), that does not mean we have achieved absolute knowledge. The big bad world includes things you haven't thought of (they are extensively excluded), and some people you are talking to may have inclusions you haven't yet learned. And so there really needs to be a rule for extensive exclusion, both at the level of nature (which includes some stuff *no one* knows) and culture (which includes stuff that maybe someone knows, but not you). This is the thing Google can't do, deal with either nature or culture as factors that are extensively excluded from its programming. It brings us to this form.

Exclusion: This is called "Dichotomy" or classically called the *fundamentum divisionis*. Things always sound more important in Latin, remember.

The norm is easy:

$$(\forall x): (x > A) \rightarrow \neg(x > A)$$



Note that the right side of the combination depends on the *same* defining form as the left, but by *exclusion*. We find everything in the class by knowing that our principle of division exhaustively excludes everything in the class that is not extensively included in its class concept. This is a fancy way of sayin', if it ain't in the class, I don't know anything about it. It's weird, but here's how it works:

Given $(\forall x): (x > A) \cdot \neg(x > A)$, in Boolean we can say: "A + -A." The *sum* of A + -A = 1, but we actually say $1 = (A + -A)$ to make clear that we are defining 1 (the universe class) by a process of exclusion. In terms of existential import, this norm allows that:

$(\exists x): \neg(x > A)$ may become $(\exists x): (x > -A)$.

That is a powerful transformation. Magical even. If you want that in the language of Mr. Square, the O proposition is obverted to an I as a *specification* of the universal. This seems to solve the problem of existential import by drawing on the power of obversion. You don't know what obversion is because I didn't make you learn that, but you can look it up. I once wrote an essay about it. Here it is (no one really expects you to read it, but at least you know it is out there and gives more information about this difficult and magical transformation):



<https://url.rylanbooks.com/D9PvO>

The principle of division removes a weakness in Inclusion Type 5, that is, complete mutual exclusion, which we expressed negatively: $A \times B = 0$. We won't explore it here,

but the aim is ultimately to express all inter-class relations using $<$ and class complements. It can be done. When it is carried through to the logical end, it becomes a proof for the existence of an Absolute Experience that includes all of my experiences, both possible (in one sense of that word) and actual. That is explained in the essay you don't have to read that I just mentioned.

Note that we can also say: $A \times -A = 0$. Here we find the null class, but we don't quite "define" it. The null class is included in every possible class. Thus $0 < A$, which expresses that kind of inclusion where A is a distributed concept, because 0 includes all incompatible properties along with those that are candidates but less than the universe class. Thus:

$(\forall x): (x > 0) \supset (x > A) \cdot (x > -A)$

And with that, you have a full set of formulas to include and exclude intensively, that is, conserve your meaning (not preserve, it has been massively generalized) through the series of changes that makes it possible to write your meaning as



relations of 1's and 0's.

There. You're done.

EXERCISES:

You can think of this as your comprehensive final exam. You could not have dreamed of doing this before working through this book. And yet, it will still be the most challenging thing you have ever tried. You are prepared, but not really trained to do this. But you'll give it the old college try, because you are in college. This is the rodeo. Or at least, it's a warm up for a rodeo.



Photo by Thomas Leuthard on <https://pxhere.com/en/photo/479147>

You will be attempting to capture and formalize a tiny bit of meaning from this image. You will do so at the cost of ignoring most of what this image really means, historically, artistically, morally, and socially. But that is the cost of creating a formal context. It is fair to be aware that the person/people who took the photograph (it is a "movie still," which means it was chosen from tens of thousands of images captures on movie film) formalized the context in a sense by reducing a complex situation to only what is included within the frame, and



all that is in the frame was devised for the story; thus all else was extensively excluded from your knowledge, except by inference and suggestion. Further, I excluded all other candidates for images in this exam by including this one. These acts of inclusion/exclusion are already proto-formal (that is, they could easily be formalized) in Boolean symbols. But you will work with this image *as it appears here*. Treat as a conception. There is plenty of meaning included within the frame to further reduce and formalize. You will bring it into the barn and wash and groom it into a class; you will turn it into a determinate concept. You will take it to the corral –actually you will do that first because it is easier. Your choices will not be morally or socially or historically “neutral,” no matter what they are. Consider that point in choosing the purpose of your inquiry. The point is “what can *you* do?”

PART ONE: Creating a Formal Context to Serial Predication.

1. List the important elements (which will eventually become *terms*) depicted in this image. Feel free to give proper names to the people or things, or some other sort of one-word tag that helps you remember which is which.
2. List the most important *relations* made visible by these terms.
3. Choose one word for the most important relation. This relation should be keyed to the main *purpose* of the activity or activities depicted. (what is happening here?)
4. Work your conceptions (both names and relations) into concepts. Make a schema.
5. *Reduce* (the painful part) the class members you listed above to only those elements without which this image cannot be a case of the concept you have named. (Add some new members to your list above if needed.)
6. Fill in this schema for the Universe of Discourse to which all of these steps belong to complete the formal context.

1. Purpose of the Inquiry:

2. Concept:

3. Terms:

4. Relation:

5. C = (



7. Express your schema in #6 as a serial predication *in symbols*, following our patterns in the book. Now, make it a syllogism. (Remember, the minor term must be affirmative, the Middle term must be distributed in the second predication, etc. These are common concepts, enumerated and individuated.)

PART TWO: Serial Predication to Class Membership.

9. Choose a *defining* form relevant to your primary relation and provide it here (x must . . . , as in x must die to say all class members are mortal, or x must have fellows, to say that all class members are individual humans). I am aware that this is hard and that you have not done it before. You will not know whether you have done it right. Do your best. It is best to choose a defining form that either (1) describes *all* the elements in your UD, or that (2) *divides* the UD into clearly defined groups. Looking at the forms of inclusion and exclusion in the end of the chapter, you should glean what will happen if you divide your class, rather than generalize over it. NOTE: The defining form does not have to be the same as the conclusion of the serial predication from #8 or either of the two premises you formed there. We are moving from worries about meaning to worries about “logical structure” –from propositional forms to propositions of the universal sort. If you do this right, your meaning should be conserved. You may want to refer back to the original image in choosing these defining forms, but do not change the UD you have created; you may wish to consult the purpose of your inquiry. There *can* be a productive relationship between logical functions as applied to considerations of affirmation and negation in serial predication and class relations as applied to membership and inclusion/exclusion, but at the level of class and membership, your UD has essentially become “data” that can be treated independently of its origin in images and purposes.

Put your defining form here:

x must . . .

10. Assume that every formula finds all and only what it includes, and that is the universe class. Using the Universe of Discourse you created in question #6 (sub-part 5), which are the symbols for your common concepts, express in *class symbols*, your universe class. You will have to use combination (*), “is to” ($>$) and perhaps implication (\supset) and perhaps negation (\neg) to do this. You will be using one of the five forms of inclusion, or the exclusion form. This is a matter of knowing what you really said (included and excluded) in making your conclusion. It means you fill in one of the class formulas using your symbols, and it will express basically what it takes for your



term, considered as class members, to be well-defined and determinately related to each other, completely.

PART THREE: Boolean Algebra

11. Express the relation from question #10 in Boolean inclusion symbols such that it = 1.
12. Express the relation from question #10 in Boolean inclusion symbols such that it = 0 (finds the null class).

Bonus: Use Boolean complements to express these inclusions and exclusions as sums and/or products of your inclusion symbols, using the two tables of outputs. You have four Boolean operators and three terms (p , q , and r on the second table). I am asking you to generalize your result. You do this one and I will be impressed. You're ready for an advanced course in logic.



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